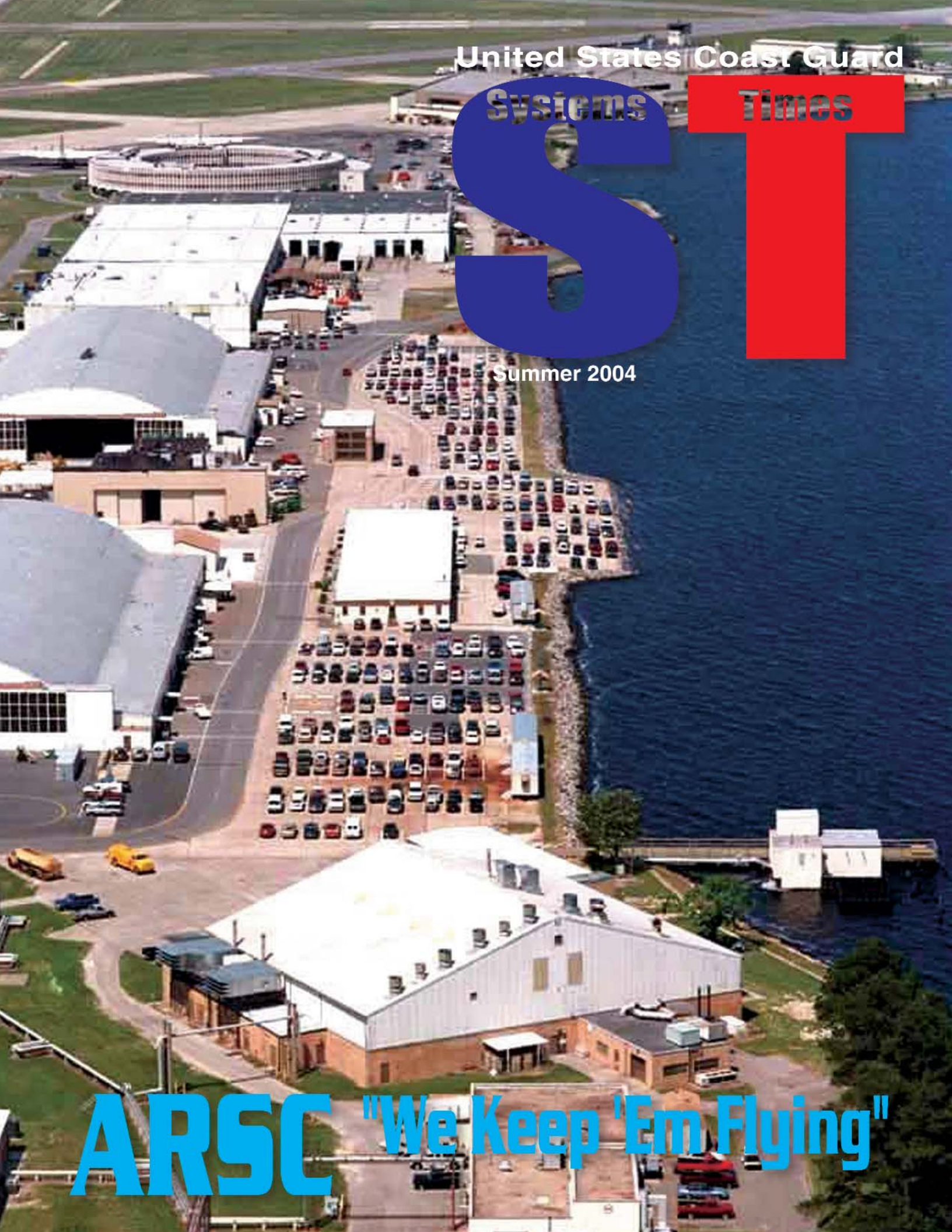


United States Coast Guard

Systems Times

Summer 2004

ARSC "We Keep 'Em Flying"

U.S. Coast Guard Systems Times

Working Today to Challenge Tomorrow

U. S. Coast Guard Systems Times

COMDTPUB P5700.2

The U.S. Coast Guard Systems Times is published quarterly by the Assistant Commandant for Systems. This publication is unofficial and not authority for action. Views and opinions expressed are not necessarily those of the U.S. Department of Homeland Security or the U.S. Coast Guard. We encourage readers to submit articles and letters to the editor. Authors are encouraged to submit articles through the Program Representative. The Systems Times Editor and the Systems Directorate Management Board retain final approval authority for the publication or non-publication of all article submissions. We will make every effort to publish all submissions. We also reserve the right to edit submissions for length, accuracy and grammar. All letters to the editor must be signed along with current address and telephone number.

Article and Photo Submissions:

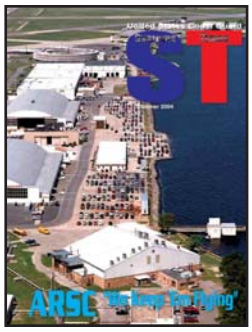
Articles should be about 500 words long; however, C4 and engineering specific articles can be up to 2,000 words. To have your article considered for publication, photo(s) must accompany each article. Articles can be submitted by FedEx in hard copy and/or in Microsoft Word on a 3.5 disk, CD, or e-mailed electronically. Please submit original photographs and graphics. All slides, photos, graphics and illustrations should be in color where possible. Please include **by-line** when submitting article. Articles without **by-lines** will not be considered for publishing. Let us know if you want your photos and graphics returned to you. Submit inquiries, letters, articles, and photographs to:

Editor, *Systems Times*
Commandant (G-S)
Room 6120
2100 Second St., SW
Washington, DC 20593-0001

Phone: 202-267-2593
FAX: 202-267-4245
E-mail: kfreese@comdt.uscg.mil

Submission deadlines are as follows:

Fall 2004 - 06 July 2004
Winter 2005 - 04 October 2004
Spring 2005 - 03 January 2005
Summer 2005 - 01 April 2005



***On the Cover:** Aerial view of the U.S. Coast Guard's Aircraft Repair and Supply Center, Elizabeth City, North Carolina.*

Contents

***On the Back*: ELIZABETH CITY, North Carolina -- A quick inspection of the propellers is one of the many jobs of an Aviation Maintenance Technician. Aviation Maintenance Technicians (AMT) perform ground handling and servicing of aircraft and conduct routine aircraft inspections and aviation administrative duties. AMTs inspect, service, maintain, troubleshoot and repair aircraft engines, auxiliary power units, propellers, rotor systems, power train systems and associated airframe and systems specific electrical components. USCGH photo by Telfair Brown**

Corrections:
In the Spring 2004 issue on page 14, the by-line should read Nick E. Mpras, not Nick D. Mpras and Jacob Patmaik should read Jacob Patnaik.

Page 45, by-line should read Tom Pigg and not LTJG Dan Rogers.

From the Chief Engineer

Greetings:

And welcome to the Summer 2004 Issue of *Systems Times*. In the last issue, I commented on our Systems' state of readiness as reflected by its Infrastructure. Our support challenge is to maintain our legacy assets in the highest state of readiness possible until they are replaced by the new generation of Deepwater assets. Adding to this challenge has been the surge in operations subsequent to the 9/11 attacks that has substantially increased the optempo and increased operational hours on our legacy assets.

As I stated previously, we must focus on sustainability and performance. In this issue, I want to focus on one very vital element of our Infrastructure … aviation. In particular, the extraordinary efforts put forth daily by our men and women at the Aircraft Repair and Supply Center in Elizabeth City, North Carolina to keep our aviation assets flying … safely.

On 17 December 1903, Wilbur and Orville Wright made the very first flight in Kitty Hawk, North Carolina. The flight lasted 12 seconds … only 12 seconds, but their vision of a flying machine changed the course of history. Their small step on that cold and windy day constituted a quantum leap for aviation. So on this 100th anniversary of the first flight, it's fitting that we dedicate this issue of *Systems Times* to our Center of

Grumman JRF-3 V192

Excellence for Aviation, the Aircraft Repair and Supply Center (ARSC). In this issue, you will read about how, through the effective application of strategic thinking, leveraging technology, sound business practices, relentless pursuit of excellence, and sheer dedication, these men and women have elevated ARSC to a quality world-class organization in an extraordinarily challenging budget environment with a demanding high operational tempo. At ARSC, every effort of every activity of every day is singularly focused on living up to their motto *"We keep 'em Flying."* In an environment where the consequences are high, they all recognize that failure is not an option. I urge you to read about the phenomenal service that ARSC provides to our Service and to this great nation.

It is with great sadness that I inform you about the passing of RADM Peter A. Bunch, U. S. Coast Guard retired, on 12 May 2004. RADM Bunch was our Chief Engineer from 1991 to 1994, the position from which he retired. His distinguished career included combat duty in Vietnam, and serving as the Engineer Officer, Executive Officer and Commanding Officer on board High Endurance Cutters. He was truly a Coast Guard hero and will be greatly missed.

The season of transfers and transitions is upon us. The summer is normally accompanied by the requisite amount of anticipation, excitement and sometimes the angst about new assignments, new bosses, new houses, new schools, new friends and for those retiring … old friends, new places and new routines. To all those in transition, I wish you and your loved ones the very best and I want to thank you for your selfless and dedicated service to the Coast Guard and the United States of America.

As always, I thank all of you for your unwavering commitment to our Coast Guard and our great nation.

Erroll M. Brown RADM, USCG
Assistant Commandant for Systems
"Chief Engineer"

Welcome to ARSC

the Aircraft Repair and Supply Center ~ an Aviation Center Of Excellence! ARSC is the Coast Guard aviation logistics center, providing one-stop shopping for all Coast Guard aviation logistics support. As the sole industrial complex for Coast Guard aviation, our mission, *providing air stations with depot level maintenance, supply, engineering and information services to support Coast Guard missions*, has earned high praise among government logistics organizations and the private sector. Our unique combination of capabilities is unprecedented in government and industry. ARSC has worked long and hard to become the only place in all of government aviation where depot maintenance (programmed depot level maintenance and extensive modifications), engineering, procurement, supply and the information hub are co-located. In essence, we are the who, what, when, how and where of Coast Guard aviation and take our motto, *"We Keep 'Em Flying,"* to heart.

HISTORICAL PERSPECTIVE. In 1939, the federal government purchased the land on which the Support Center Complex at Elizabeth City, North Carolina is located and subsequently built the U. S. Coast Guard air station to serve as the central base on the East Coast. Elizabeth City is situated approximately 40 miles

south of Norfolk, Virginia, and 30 miles west-northwest of Kitty Hawk, North Carolina ~ the birthplace of flight. This site was chosen not only for its centralized East Coast location, but also for its strategic value to provide for the safe operation of seaplanes, the predominant aircraft of that time, on the placid Pasquotank River. Prior to this, the Coast Guard never had a central facility for aircraft overhaul or parts warehousing. However, with the substantial growth that the Coast Guard experienced during World War II under the Department of the Navy's control, the concept of such a centralized facility to service Coast Guard Aviation gained momentum.

In April of 1946, a small group of officers and enlisted men were assigned as a sub-unit of Coast Guard Air Station Elizabeth City for the purpose of establishing the Coast Guard Aircraft Repair and Supply Center (originally titled the Aircraft Repair and Supply Base). After nine months of concentrated effort, the unit was commissioned as a Headquarters unit with a complement of ten officers and sixty-three enlisted men.

CURRENTLY. Since this time, ARSC has expanded tremendously and is well poised for further growth. During the mid 1990's, Business Process Re-engineering was used to develop our current streamlined customer focused organization (Figure 1). The product line concept brings all critical elements of a particular aircraft under one roof with one unified purpose. Depending on the airframe and whether Programmed Depot-level Maintenance (PDM) is performed, product line cells (branches) can include engineering, supply, PDM and PDM support.

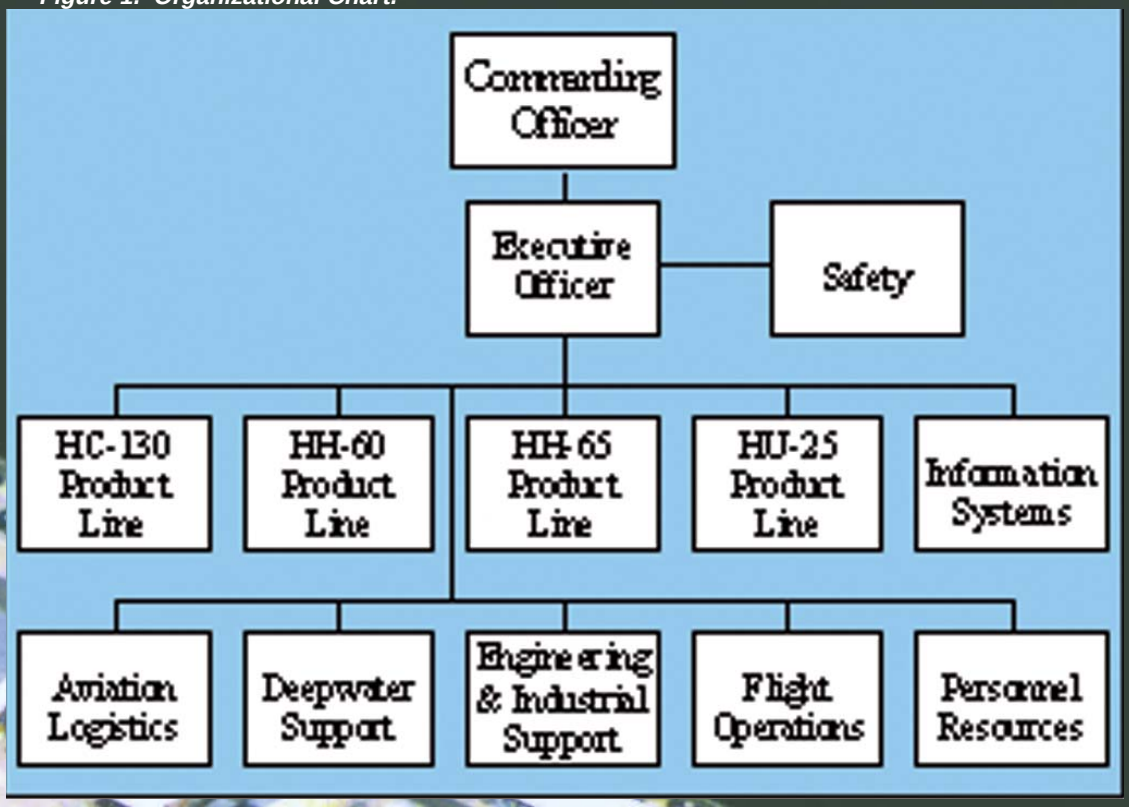
ARSC is structured around our products and services. All major support functions related to an aircraft system are contained within four streamlined product lines. The four product lines at ARSC currently focus on the following aircraft: HH-60 "Jay Hawk" Medium Range Recovery Helicopters; HH-65 "Dauphin" Short Range Recovery Helicopters; HC-130 "Hercules" Long Range Surveillance Aircraft; and HU-25 "Guardian" Medium Range Surveillance Aircraft. However, due to the expertise and dedication of our workforce, the Aircraft Repair and Supply Center is well poised to enter new product lines.

ARSC overhauls, repairs and modifies all of the Coast Guard's aviation fleet, in addition to being its inventory control point, engineering technical center and information technology center. For example, we are responsible for overhauling/repairing aircraft; providing aircraft parts and equipment to the fleet; re-engineering and manufacturing of aircraft parts; performing complex, multi-million dollar contracting actions; providing technical engineering support; and providing teams of personnel who provide on-site field assistance to Coast Guard air stations and deployed aircraft.

Our primary mission environment consists of 25 Coast Guard air stations that operate approximately 200 aircraft. Air stations are located throughout the continental United States, Alaska, Hawaii and Puerto Rico (Figure 2). Our reach is far. Deployed aircraft are supported worldwide. ARSC's annual workload includes overhauls of approximately 40 aircraft and modifications to another 30. On an average day at ARSC, our team:

- Ships 620 aircraft parts;
- Responds to over 100 technical/engineering questions;

Figure 1. Organizational Chart.



- Performs depot maintenance on 20 aircraft;
- Works on an additional three aircraft for "Drop-In" maintenance;
- Manages 180 contracts valued at $450M;
- Has two "expert teams" repairing aircraft at air stations;
- Overhauls 300 component parts; and
- Processes 600 Aviation Logistics Management Information Systems (ALMIS) transactions.

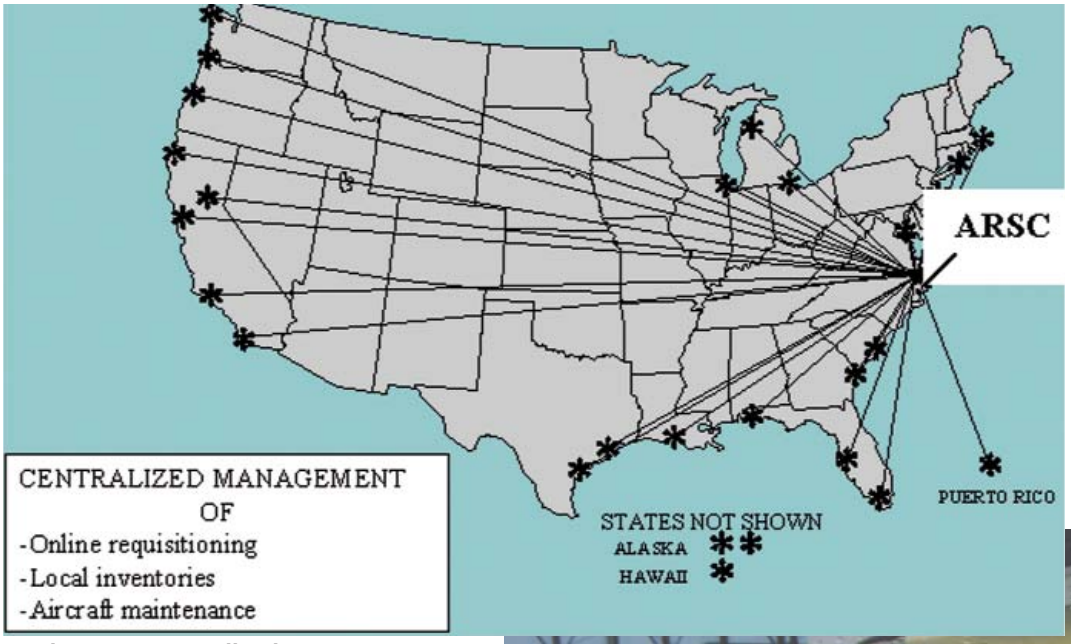


Figure 2. Centralized Management Map.

FACILITIES. ARSC occupies 15 buildings, with approximately 514,500 square feet of floor space on 55 acres of the 822-acre Support Center complex. This includes two large production hangars, three acres of warehouse space, a state-of-the-art jet engine test cell, machine shop and an aircraft paint hangar.

Our emphasis on exemplifying world-class environmental stewardship has resulted in distinguished recognition by both state and federal oversight agencies. The Coast Guard's environmental inspection office has cited ARSC as a role model for compliance management and inter-command partnerships.

PROFILE OF EMPLOYEES. ARSC employs 969 dedicated workers (170 military, 527 civilians and 272 contractors) making us the largest employer in Elizabeth City. Our diverse and talented employees personify our values of Honor, Respect and Devotion to Duty. A heartfelt commitment to ARSC's success is consistent throughout the workforce, which includes professional, administrative, clerical, technical, mechanical and aircraft maintenance positions. ARSC possesses a wealth of intellectual capital with many employees possessing or pursuing advanced degrees, certifications and memberships in professional organizations. Our non-supervisory personnel are represented by the International Association of Machinists and Aerospace Workers, with which ARSC maintains a close teaming relationship.

BUDGET. With a FY03 [Fiscal Year 2003] AFC-41 budget of $208M and $29M AC&I [Acquisition, Construction & Improvement] funds, we control the largest unit-operating budget in the Coast Guard and possess the largest inventory valued at $831 million. We manage aviation inventory at more than 100 locations throughout the United States and Puerto Rico … and we do it well! Because of stringent quality and tracking requirements for aviation material, ARSC owns and manages our inventory from cradle to grave. We were the first Department of Transportation organization to pass the Chief Financial Officer's Act audit and

have continued to pass all Department of Transportation Inspector General (DOT-IG) audits, with superior results. We have set a high standard within the Coast Guard, and among other governmental agencies, by achieving a ***99.995% dollar value accuracy***, well above the auditor's standard of 95%. The aviation inventory accounts for approximately 76% of all Coast Guard reportable inventories and, by itself, 64% of the entire Department of Homeland Security inventories. Since ARSC has such a high dollar amount of inventory, inventory management is crucial.

GOVERNANCE SYSTEM. ARSC's senior leadership deploys its strategy through an active Executive Steering Committee (ESC). The ESC is governed by a charter and provides a forum that focuses attention and energy on current and strategic issues.

CUSTOMER REQUIREMENTS.
ARSC's primary customers are the Coast Guard Air Stations, Aviation Technical Training Center (ATTC), Aviation Training Center (ATC) and customers external to the Coast Guard, whom we support on a fee for service basis. Our customers' requirements are based on Commandant directives and then customized to fit unique needs of each segment. The firehouse response model of a typical air station requires very high service levels from ARSC.

STAKEHOLDERS. We partner with various offices in Coast Guard Headquarters and the Area Commands to provide support to the fleet. Our stakeholders expect us to provide the best value for our dollars spent. These Stakeholders include:

- Office of Aviation Forces (G-OCA)
- Office of Aeronautical Engineering (G-SEA)
- Office of Safety, Security and Environmental Health (G-WKS)
- Pacific Area Commander
- Atlantic Area Commander
- Coast Guard District Commanders

CRITICAL SUCCESS FACTORS. Critical success factors are processes, factors or attributes directly related to missions, outcomes, products or services that one must do or manage well in order to achieve successful performance. ARSC's critical success factors are:

- Not Mission Capable - Supply (NMCS)
- PDM In-service Intervals
- Aircraft Availability
- ALMIS Availability

If we fail in these areas, we place the Coast Guard's mission and aviators' lives at risk!

KEY MISSION AND SUPPORT PROCESSES. Process Control is important to us. We closely monitor our critical processes to ensure our customers' and stakeholders' requirements are being met. Our key business processes are:

- Depot Level Maintenance
- Supply Chain Management
- Information Services
- Engineering Services

Our key support processes are:

- Warehousing and Distribution
- Procurement
- Human Resource Management
- Technical Support
- Industrial Support
- Financial Management

SUPPLIER/PARTNERING RELATIONSHIPS. As both an industrial complex and a logistics support organization, ARSC purchases and partners with many suppliers. Due to the critical and wide-ranging nature of our business, we have nurtured close relationships with our suppliers. The supplier's criticality and importance determines the level of partnering. For example, we are partnered closely with our aircraft engine suppliers, but less so with our suppliers of small common parts. Some of our critical suppliers and the service or product supplied are listed in Figure 3.

We work closely with suppliers to foster collaborative relationships. We have a well-deserved reputation, in the Federal Government and in the commercial industry, for working outside the box and fostering "win-win" agree-

Figure 3. Key Suppliers.

KEY SUPPLIERS	SERVICE/PRODUCT SUPPLIED	IMPORTANT PRODUCT/SERVICE
Aircraft Manufacturers	Component parts	Reliable components
Engine Manufacturers	Overhaul services	On-time delivery
Avionics/Electronics Manufacturers	Technical support	Fast, accurate responses
Other Government Agencies	Software development & integration	Software changed to meet changing business requirements
Software/Hardware vendors		

ments with our suppliers. We are a leader in Performance-Based Services Contracting promoting positive partnerships between contractors and government.

STRATEGIC CHALLENGES. Profound changes are taking place throughout the Federal Government. These changes are having a far-reaching impact on the way we plan and manage our resources. ARSC, like most Coast Guard units, operates in a restricted environment. Funding, regulatory and political constraints impact our ability to meet our goals. Several factors influencing ARSC include:

- Sustainment of legacy aircraft;
- Department of Homeland Security integration;
- Operational mission creep;
- Aging workforce;
- Deepwater;
- Facility constraints;
- Fair Act and A-76; and
- AFC-41 Budget funding level.

ARSC faces many challenges. The cost of aircraft ownership increases at a rate of 8-12% per year. However, our budget process only provides a 2% inflation factor. Thus, our real budget dollars are declining while our operational tempo increases. Fortunately, our innovative people continuously create and implement initiatives, which improve our processes and help our budget dollars go farther. Some major innovative programs include new product development, performance-based service contracts, award term contracts, reliability-centered maintenance, rapid deployment of aircraft improvements and keeping our information systems on the cutting edge of technology.

ARSC is a critical player in the Commandant's initiative to renovate, modernize and/or replace the Coast Guard's entire complement of Deepwater ships and planes with an integrated multi-mission flexible system of surface, air, Command, Control, Communications, and Computers, and Intelligence, Surveillance and Reconnaissance (C4ISR), and logistics capabilities at the lowest total ownership cost. As the provider of logistics support to the entire Coast Guard aviation fleet, ARSC is uniquely positioned to participate in the Deepwater Project. ARSC supports the Office of Aeronautical Engineering (G-SEA), the Office of Systems Deepwater Integration (G-SDW) and the Deepwater Program (G-D) by providing logistics data, including maintenance, reliability, availability, inventory and cost data for the Coast Guard's legacy aircraft to the Industry Team for their optimal "system of systems" solutions. Continuing to support legacy aircraft in this transitional period is extremely challenging.

PERFORMANCE EXCELLENCE. As Coast Guard Aviation's leader providing mission-critical overhaul and repair services for aircraft and aircraft components, we

consistently deliver high quality products and services, and we deliver them in a cost-effective manner. ARSC utilizes best-business practices to ensure this happens and to maintain an organizational focus on systematic performance improvement.

ARSC utilizes the International Organization for Standardization (ISO) 9001-2000 standard, an international quality standard, to ensure our Business Management System is effective and continually improving. ISO certification ensures our organization has a documented quality system, including verifiable processes, measures of effectiveness, process and document control, corrective/preventive actions and a continual improvement plan, that is fully deployed and consistently followed.

To ensure systematic financial and resource stewardship, ARSC utilizes an Activity Based Cost (ABC) Management Program. This enables ARSC to maintain full costing visibility of our major programs and products. Leveraging ABC methodology has allowed ARSC to attain an unprecedented level of management oversight in assigning resources to outputs and services. This management oversight is in direct alignment of the President's Management Agenda.

The Aircraft Repair and Supply Center is an aviation center of excellence whose expertise, can do spirit, and proven track record has tremendous impact Coast Guard wide. As a result of 9/11, and our subsequent transition to Homeland Security, ARSC is in a unique situation. This has led ARSC to explore other mission environments such as support for the Department of Homeland Security and the Department of Defense. We welcome the possibilities associated with sharing our capabilities and expertise with other aviation agencies.

Our vision, "We Keep 'Em Flying by providing the right stuff, at the right place, at the right time, at the right cost … *EVERY TIME*" is an essential element in obtaining the Coast Guard's vision, "The world's best Coast Guard … Ready today … Preparing for tomorrow" and is a foundational element in the Department of Homeland Security's mission of protecting our country. ST

THE COST OF OUTSOURCING OUR CORE COMPETENCIES

The State of HC-130 Overhaul in the Coast Guard

by LCDR Shannon McCullar
ARSC, C-130 Product Line

Core competency: (noun) ***'kOr 'käm-pətən(t)-sE***
1. Primary area of expertise. Narrowly defined fields or tasks at which a company or business excels. (pl) Primary areas of specialty.

Like many other Coast Guard programs, aging assets and increasing operational demands have brought the Coast Guard C-130 program to a critical crossroad. Two management philosophies compete for our future, and the future of the Coast Guard itself; capitalizing on commercial markets through contract outsourcing, and exerting control through organic capability. In the case of the C-130, the direction we chose will ultimately extend or shorten the remaining useful life of the C-130H fleet.

Never has doing more with less had a more practical application than in today's Coast Guard. In the C-130 program, years of maintenance at the hands of contractors and Other Government Agencies have left our C-130 fleet with a daunting maintenance deficit. This deficit has already resulted in the early retirement of three aircraft, sharply increasing maintenance costs and ever decreasing aircraft availability. The challenge before us is to restore our aircraft to a more serviceable condition, increase availability and improve the overall viability of the program while controlling costs. We have had some success, but have very far to go before we can claim that supporting the C-130 is an efficient and dependable operation.

A Brief History

The Coast Guard received its fleet of C-130Hs between 1972 and 1987. At that time, rather than "reinventing the wheel," our predecessors decided to rely on the Air Force to maintain and overhaul our aircraft in accordance with Air Force requirements, even relying on the Air Force to perform work, select and provide contractors, train our crews and pilots, and provide engineering services. In the end, this partnership worked to the disadvantage of the Coast Guard.

While the Air Force overhaul program was well suited for the Air Force, the program proved insufficient for the Coast Guard due to our more corrosive operating environment and different unit maintenance. As a result, our aircraft have deteriorated too rapidly resulting in increasing unplanned down time, skyrocketing overhaul costs, and growing overhaul intervals.

In 2001 this vicious cycle forced the Coast Guard to take drastic action. We retired three operational aircraft years (possibly decades) ahead of schedule, and increased our planned support aircraft (aircraft cycling through depot maintenance) from four to five. At the same time, we generated an original Coast Guard work specification describing in great detail exactly where and how we wanted our aircraft inspected. We believed that by increasing the thoroughness and applicability of the overhaul inspection we could reverse the deterioration of our aircraft. However, with neither the facilities nor expertise to perform the work "organically," we were forced to find commercial vendors to execute our specification. By reducing operational fleet size (from 26 to 22), increasing support aircraft (from four to five) and improving the overhaul process, we planned to improve the availability, maintainability and safety of our remaining fleet.

These actions have had mixed results. Since implementation of our more developed work specification, aircraft delivered from overhaul are in better condition. However, due to highly variable vendor performance to cost and schedule standards, costs have skyrocketed, time in overhaul has grown uncontrollably, overhaul intervals have reached their upper limit, and availability suffers as aircraft are grounded awaiting induction into overhaul.

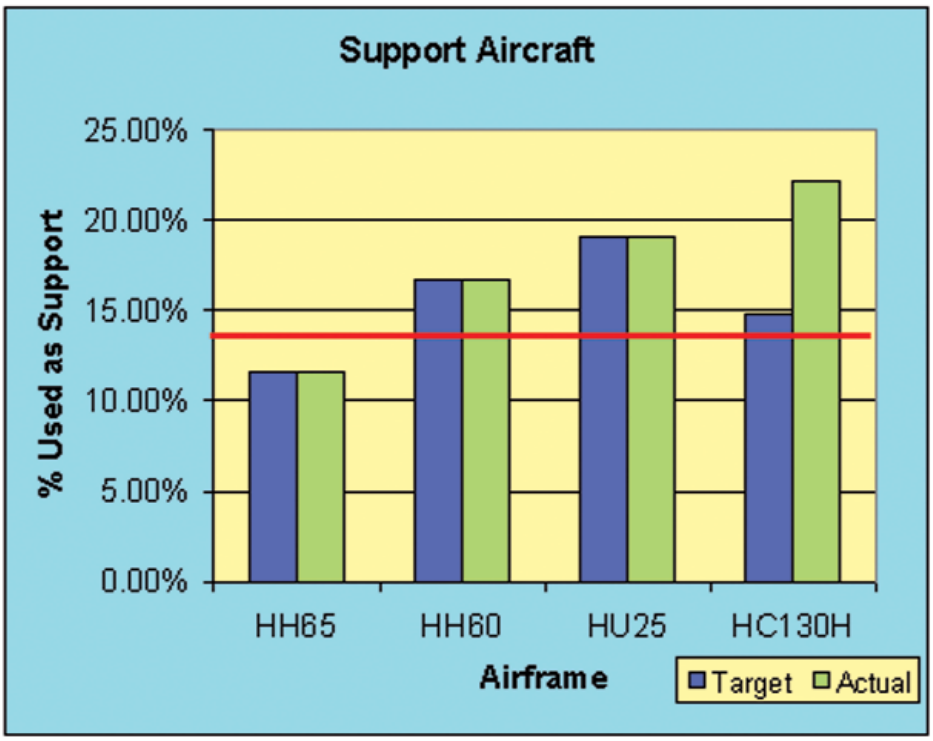
Adding to these complications are unscheduled groundings due to lingering defects on aircraft yet to undergo our improved overhaul, and heavy operational demands (for example, Air Station Clearwater must fly programmed hours for 6.5 aircraft with only five aircraft). Unscheduled groundings and early inductions into overhaul make our actual number of support aircraft six rather than the planned five, and reduce our aircraft available for operational tasking to 21. Likewise, heavy operational demands increase in the rate at which hours accumulate on aircraft, and compress the maintenance schedule beyond what our system is designed and staffed to support. These conditions serve to accelerate and amplify adverse affects.

Current State

The cost of supporting the C-130 has become extraordinary. At issue are both the growing costs of overhaul, vendor performance to schedule, and the 22% ratio of support C-130s to total C-130s (6 to 27) required to meet our operational needs.

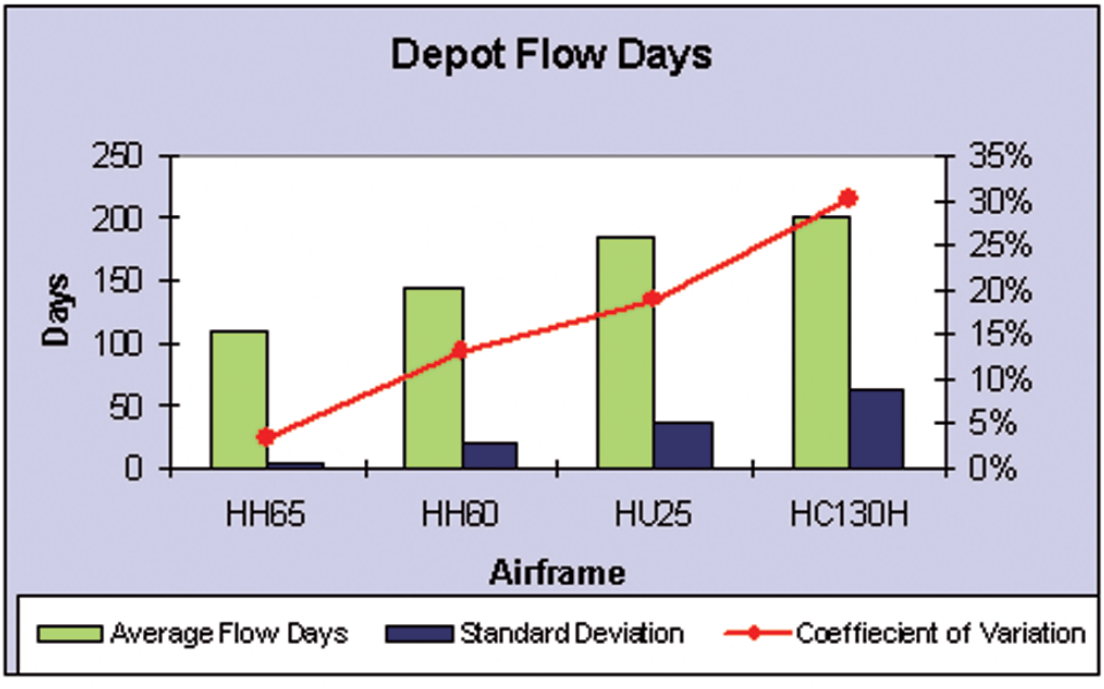
A support ratio of 22% is abnormally high. As a benchmark, the Coast Guard HH-60 program has a support ratio of 11.9% (5 to 42), the HH-65s is 11.5% (11 to 95), and the HU-25s is 14.3% (3 to 21). The Coast Guard average excluding the C-130 is 12.03% (19 to 158). The C-130's high support ratio means that C-130s spend a disproportionate amount of time in a nonproductive maintenance status compared to other airframes.

This disparity exists due to ARSC's lack of facilities to execute the C-130 overhaul (all other airframes are overhauled at ARSC), and the C-130 overhaul contract's inability to perform modifications and upgrade. To meet our operational needs with these limitations we must maintain three C-130s in overhaul at commercial vendors, two C-130s in modification at ARSC, and over two thirds of the time we have an additional unscheduled aircraft in work as well. This arrangement obviously leads to a great deal of inefficiency in the form of duplication of effort.



Given these limitations, we have employed three separate vendors to execute our C-130 overhaul specification. Vendor performance in terms of cost and schedule has proven consistently disappointing. Originally, commercial vendors assured us that the required work to complete our new specification could be completed in 120 days. The actual time in work has averaged 201 days, with a high of 343, a low of 145 and a standard deviation of 61 days (coefficient of variation = 30.3%). By comparison, over the same period, the HH-60 product line has produced similar overhauls in an average of 145 days, with a standard deviation of 19 days (coefficient of variation = 13%). Similarly, the HU-25 produced overhauls in an average of 185 days, with a standard deviation of 35 days (coefficient of variation = 19%). The HH-65 produced overhauls in an average of 109 days with a standard deviation of only 3.5 (coefficient of variation = 3.2%).

The high variation of C-130 overhauls is extremely damaging. Not only does it complicate scheduling, but it also results in an ever-growing queue (backlog) of aircraft waiting to enter the overhaul system. As this queue lengthens, the time between overhaul extends. When the time between overhaul for an aircraft exceeds the maximum allowable overhaul extension, the aircraft is grounded. This grounded aircraft typically represents an operational GAP. The C-130 program has experienced two such GAPS this year alone. And we expect more.



The reason we expect more groundings is simple math. Assuming that we maintain our current state of 22 operational and five support aircraft. If we want to achieve a 48-month overhaul interval for those 22 operational aircraft, we must induct and deliver from overhaul 5.5 aircraft per year (22/4). If overhaul requires 201 days in work, then each aircraft line can produce 1.82 aircraft per year (365/201). In order to produce 5.5 aircraft per year, we must

keep 3.022 aircraft in overhaul continuously (5.5/1.82). This logic indicates that with three aircraft in overhaul, we should produce an AVERAGE of 22 operational aircraft over time, with an AVERAGE induction interval of 48 months. However, queuing theory has proven that when arrival rates are erratic (inductions are not evenly distributed), and service times are unpredictable (flow days have a high coefficient of variation) excess capacity is required to prevent queues from developing. With three aircraft in overhaul (two in modification), we will not have the necessary excess capacity to prevent queues from forming. Queues will form and grow steadily into the future, causing more frequent groundings and decreasing aircraft availability.

We have attacked this problem by attempting to reduce the flow days of our vendors, or at least make them more predictable (removing a measure of variation). We have committed considerable time, effort and funding to pre-purchase parts, place experienced representatives on scene, provide extensive technical support, offer meaningful financial incentives ($5,000 per day) for early delivery and require substantial penalties ($8,000 per day) for late deliveries. Yet, we remain frustrated by our lack of success. Programmed Depot level Maintenance (PDM) intervals are growing past available extensions due to unreasonably long and ridiculously variable vendor schedules, and costs have almost tripled since Fiscal Year 2000 (FY00).

The Road Ahead

It is within this framework that the Coast Guard C-130 program once again faces some difficult choices. With increasing costs and decreasing availability it would be easy to fall into the trap of believing that we must take actions like those we took in 2001 to keep the C-130 program viable. In that case, the C-130 would have but three choices. They would be:


U.S. COAST GUARD

This photo shows the overcrowded conditions at our Coast Guard C-130 maintenance facility at ARSC. There are two additional aircraft in the hangar. These three are being worked outside and unprotected from the weather.

1. Increase the number of support aircraft,
2. Reduce the number of operational aircraft, and
3. Reduce flow days and control production variability.

Failure to take any other action will make number 2 our default position as aircraft are grounded awaiting overhaul. However, we have seen that neither actions 1 nor 2 will provide a long-term solution. Number 3, "Reduce flow days and control production variability," is the only realistic means to reduce the support costs and increase the availability of the C-130. However, number 3 has proven elusive if not impossible. This is a logical trap that renders us immobile.

To avoid the trap, we must be very deliberate in thinking about what the Coast Guard does to add value to the system that others cannot. What are our Core Competencies? Why are the support ratios and production variances for the other Coast Guard airframes lower than the C-130's? Is it statistical process control, TQM [Total Quality Management], ABC [Activity Based Costing] or Six Sigma? Is it the source of the workforce that matters?

No, the Coast Guard adds value in other more irreplaceable ways. These are our Core Competencies when it comes to aircraft maintenance:

1. The Coast Guard adds value by owning the knowledge, full and complete, of the work that both needs to be done and has been done to all of its aircraft. Not just tacit knowledge of what was done, but intimate knowledge of how work was done, and how it might be done again.

2. The Coast Guard also adds value through situational awareness and control of the overhaul process and priorities. The Coast Guard takes advantage of its extensive knowledge of the aircraft's operating environment and maintenance issues to handle emergent problems proactively. Similarly, this intimate awareness promotes effective preparation and customization of the overhaul process for each aircraft prior to its induction. Also, as the process owner the Coast Guard is able to set priorities to maximize the Coast Guard's operational utility. These choices often differ from the priority choices that would be made by a commercial company attempting to maximize shareholder value.

3. Finally, the Coast Guard adds value through collocation of talent and assets. This allows the Coast Guard to share the means of production. By sharing one warehouse, one machine shop, one Information Technology (IT) department, etc., the Coast Guard effectively reduces overhead for every program. Additionally, the different programs share a workforce. In some cases that means moving talent from one program to another when needed, in others that means hiring people from the local market -- a pool of aircraft mechanic talent that has developed in response to the demand created by ARSC.

The Coast Guard's efforts to outsource C-130 overhaul have fallen short of expectations because we attempted to outsource our core competencies. As an organization faced with an ever-increasing demand for our unique skills, and the ever-present siren song of contractors promising improved efficiency, the Coast Guard must be disciplined in recognizing the unique value of our Core Competencies. Until we do, potential value will escape us, and our performance will continue to fall short.

The ABC Advantage:

ARSC Gains an Edge in the Cost Management Effort

by **Christi Yoest**
of Grant Thornton, LLP

In the Coast Guard's dynamic operating environment, catalysts for change are diverse and unrelenting, requiring innovative solutions that can be integrated within an organization's long-term strategic plan. Throughout the 1990's, ARSC (Aircraft Repair and Supply Center), as well as the rest of the federal government, found itself increasingly challenged by mounting competitive, financial and statutory pressures. ARSC recognized that these challenges would not fade with time, but would persist and become more complex. ARSC could no longer focus solely on "getting the job done"; it needed to do the job better and capture the metrics to prove it. Directives such as the Chief Financial Officers Act, Government Performance Results Act, Federal Activities Inventory Reform Act, and President's Management Agenda and the emergence of the Integrated Deepwater System provided the impetus for ARSC to seek a more effective management information system that would provide an extra advantage for survival in this challenging new work environment.

As proponents of process management philosophies, ARSC Commanding Officer Captain Bruce Drahos and the ARSC leadership team explored a number of management theories, including Six Sigma, Theory of Constraints and Activity Based Costing (ABC). Ultimately they chose to focus their initial efforts on development of an ABC program. It was clear that using ABC to implement an Activity-Based Cost Management (ABC/M) solution would improve ARSC's ability to better define resource needs by providing an improved understanding of ARSC's consumption and capacity. ABC/M would provide ARSC managers with the best source of data for activity and capacity management.

ABC and ABC/M

ABC is a method that shows how resources (i.e., time, materials, facilities) are consumed by activities (i.e., work performed) to produce outputs (i.e., products and services) that benefit a customer. Under traditional accounting methods, overhead rates are spread over product lines to determine cost. This often paints an inaccurate picture of actual costs and forces management to make important decisions using incomplete information. When managers use ABC information to analyze costs and identify process improvements, they perform ABC/M. Using this methodology, managers can make effective strategic and operational decisions by linking financial data to performance. In short, managers do not manage costs directly -- they manage the activities that consume costs.

Resources → Activities → Outputs

Activity-Based Cost Management

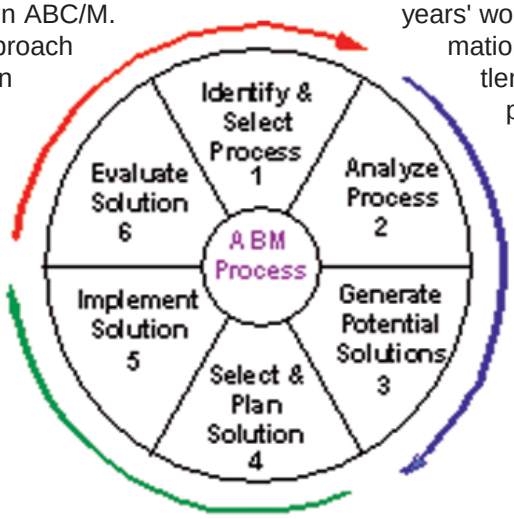
ARSC is not the only Coast Guard entity to embrace the ABC/M method. Captain Larry White, Chief of the Office of Financial Policy and Systems at Coast Guard Headquarters, supports this initiative. Captain White is fully on board with this management philosophy and believes it would assist the Coast Guard in articulating how to improve the efficiency of its processes. Says Captain White:

"*ABC/M provides the model and-more importantly -- the language to discuss resource decisions in terms people can understand. ABC/M, while often considered an*

accounting exercise, really puts activities at the center of resource discussions, which helps people logically apply the important constraints associated with funding and resources."

The support and vision of leadership is very important. Any initiative runs a high risk of failure without it. Still, concrete results are arguably more impressive, and at ARSC, numerous ABC successes have already made their marks on the organization.

Starting in 2001, the ARSC leadership team designated a full-time ABC/M program manager. From this point on, the organization was immersed in ABC/M. ARSC management changed its approach from managing functions based upon requirements to managing activities that consume resources. Grant Thornton LLP was enlisted to develop ABC/M models, which produced a wealth of ABC/M information. ARSC became one of the first Coast Guard organizations to have access to this valuable management insight.



The ABC/M Continuous Improvement Process.

Soon after, management decided to use the data to compute activity costs occurring at the end of certain process lines. In the depot maintenance process where the aircraft is test flown before delivery, it was discovered that the unavailability of pilots resulted in delays in the process flow of 39.5 hours per week while mechanics "awaited work." Further investigation showed that the activities being performed by the pilots included non-flying activities that took precedence over flying activities.

This concise analysis justified hiring a pilot whose primary role was to address the flying activities. ABC/M quantified a specific human capital shortage based upon the requirement for activities.

Because ABC/M data allows managers to view operations from a fresh perspective, it helps in developing useful solutions. For example, ARSC workers assigned to aircraft paint stripping must wear full protective body suits. During the summer months, workers must take frequent breaks due to the excessive heat. ABC/M data indicated that, during the summer, 60% of workers' time was spent in a rest and recovery status in order to maintain safe working conditions. This discovery generated a quick, cost-effective solution: Install an air-conditioning unit at the work site to eliminate process interruption. This investment yielded a positive return since the cost of the air conditioner was recovered in the form of two years' worth of saved labor hours. ABC information allowed ARSC to eliminate this bottleneck in the painting process and meet production goals during the summer months.

Clearly, the ARSC leadership team has achieved some significant early wins in the initial stages of their ABC/M implementation. Looking ahead, ABC/M will aid ARSC in supporting HH-65, HH-60, HU-25 and HC-130 legacy aircraft by providing maintenance activities and their associated costs with trend analysis so managers can compare quarter-to-quarter costs, costs from various fiscal years and so on. ABC/M will also enhance implementation of future projects, such as JDLM and depot maintenance for Department of Homeland Security aircraft, by providing trend data that can be compared to baselines to analyze costs and identify causes of variances.

Now in its third year, the ABC/M program is ARSC's tool of choice for cost and performance management. As its record of success continues as planned, ABC/M will become a permanent fixture in ARSC's overall management system.

Aging Aircraft

From the Branch Chief

Supporting an aging aviation fleet is becoming a logistical challenge. While the Coast Guard's Aeronautical Engineering Program has managed aging aircraft for years, the Coast Guard is on the brink of venturing into new arenas, which will challenge all logistical elements. The aeronautical community has to assess how it will continue to support legacy assets beyond design life, while meeting the Integrated Deepwater System timelines for service life extensions, phase-outs and acquiring new assets. In light of this, senior leadership in the Office of Aeronautical Engineering (G-SEA) and at the Aircraft Repair and Supply Center (ARSC) instituted a branch within the Engineering and Industrial Support Division dedicated to addressing the issues affecting our aging aircraft fleet. Specifically, these issues include corrosion, non-destructive inspection, wiring integrity and aircraft parts reliability (see Figure 1). The branch utilizes an integrated engineering approach that brings to bear the disciplines of materials, electrical and structural engineering. These aspects of the branch work together on projects that produce great gains in the Coast Guard's ability to achieve and extend aircraft design service life.

Branch

by LCDR Mark Ward
ARSC, Aging Aircraft Branch

Corrosion Control Program

In June of 2003 a report from the Government Accounting Office (GAO) introduced a study that estimated the cost of corrosion for military systems and infrastructure at $20 billion annually, and identified corrosion as the lead component in life-cycle cost expenditure for weapons systems. It was also determined that the Department of Defense (DoD) and military services do not have effective programs to prevent and mitigate corrosion.

The Aging Aircraft Branch's Corrosion Program Manager is tasked with managing corrosion related projects and training. The Aging Aircraft Branch's mission statement is to "Achieve and extend aircraft life by identifying and guiding implementation of integrated engineering programs encompassing structural integrity, corrosion control, non-destructive inspection, wiring, and data analysis." As a means to accomplish this goal, the Corrosion Program Manager has identified specific programs.

Figure 1. Aging Aircraft Branch Organizational Chart.

Corrosion Mapping

Monitoring the structural health of an aging fleet and predicting aircraft structural degradation has been a long-term goal in aviation. Depot level corrosion mapping is the first phase of an aircraft diagnosis and prognosis system that will predict material loss within a structural health management system. The corrosion-mapping program captures structural corrosion discrepancies found during depot level repair. The corrective action and labor hours necessary to correct the discrepancy are also recorded. The ingenuity of the mapping program is that it provides a pictorial presentation of aircraft corrosion. Using grid cards that divide the aircraft into structural sub-assemblies, the exact location of corrosion points are plotted. The information accumulated can then be extracted from a web-based map located within the Aviation Logistics Management Information System (ALMIS, see Figure 2). This map allows analysis via several different criteria, from general aircraft location, corrosion severity and frequency down to specific components. The pictorials clearly indicate the "hot spots" or areas of concern. By integrating environmental severity rates, on board sensors and air station corrosion mapping, the Coast Guard will be predicting and managing the detrimental effects of corrosion and thus avoiding millions of dollars in corrosion repair.

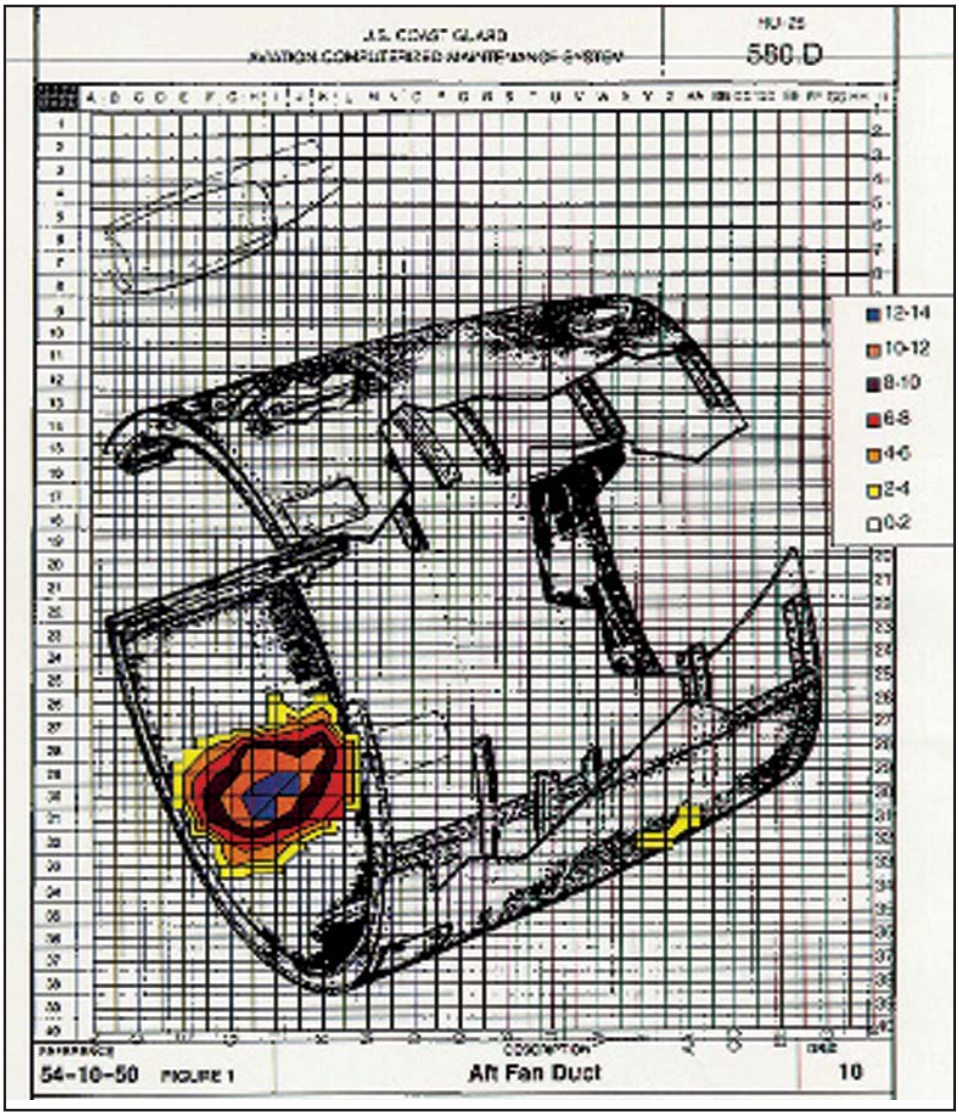


Figure 2. Corrosion Mapping, HU-25 nacelle.

Corrosion Training

Education and awareness is key to the acceptance of a corrosion program. To enhance this position, the corrosion program manager has engaged in discussion with the Aviation Technical Training Center (ATTC) and G-S (Systems Directorate) to build a continuing education program designed with our hanger deck Corrosion Prevention Advocates in mind. Structured as a "C" school, an agenda is being formed that will address refresher training for aircraft technicians and grow to include supervisors and senior leadership in the program.

Topcoat Systems Research

Interaction with outside agencies has helped the corrosion office evaluate and test requirements for a topcoat protection system. Agreements with the Coatings Technology Integration Office labs at Wright Patterson Air Force Base, Ohio, and the Navy at Patuxent River, Maryland, provides an opportunity to perform state-of-the-art testing. One of the current evaluations being performed is the effect of waxing of aircraft and the potential degradation of the topcoat protection system. Significant topcoat performance capabilities have been demonstrated that may pave the way for future topcoat protection systems.

Aircraft Dehumidification

The corrosion program manager is also developing a Coast Guard wide Aircraft Dehumidification (DH) Program. Initial tests indicate that dehumidification is a valuable tool in corrosion prevention. They also show that DH can be economically used to mitigate the risk of corrosion, declining reliability and operational aging of USCG aeronautical assets. Studies have shown that reducing the Relative Humidity (RH) below 45 percent virtually eliminates corrosion and maximizes avionics reliability. The Aging Aircraft Branch (AAB) has tested and shown the ability to reduce the internal RH to below 45 percent on all aircraft types using portable dehumidifica-

tion units. Air Station Corpus Christi has been using portable DH units on the HU-25 Falcon for the past two years. Weekly tests have also been conducted on the HH-60J stationed in Elizabeth City, and the HH-65B at Air station Corpus Christi. Initial studies show that the cost of implementing a DH program for all Coast Guard aircraft is minimal compared to cost associated with corrosion repair.

Non-Destructive Inspection

The Aging Aircraft Branch Nondestructive Inspection (NDI) Program Manager is currently providing upgrades to fleet equipment, improving technical directives and ensuring compliance to an industry accepted certification processes. Currently, there are 31 uniformed inspectors (air station personnel) certified in accordance with the recognized standard NAS-410. The NDI Program Manager recently purchased an advanced eddy current test set manufactured by Stavely NORTEC Inc. The purchase quantity is enough to outfit the entire USCG Aviation community upon initial certification training.

In addition to providing quality NDI training and ensuring top quality testing equipment are available at the field unit level, the NDI Program Manager is constantly reviewing state-of-the-art NDI techniques. The recent acquisition of Digital X-Ray Inspection equipment greatly enhances ARSC's ability to perform accurate x-ray inspections while virtually eliminating the costs associated with dated film-based x-ray inspection. The NDI program manager is also investigating applications for Thermal Imagery for advanced analysis of composite materials.

Aircraft Wiring Integrity Program

The Aging Aircraft Branch's Wiring Integrity Program Manager has the responsibility of identifying and correcting the Coast Guard's aging aircraft wiring issues. This section consists of an electrical engineer and an automatic circuit analysis technician, and is involved in efforts such as depot wiring testing and analysis, wiring corrosion prevention, utilization of new wiring technologies, improved training and improved wiring manuals.

Aircraft Circuit Analysis

DIT-MCO™ automatic circuit analysis equipment and testing is the mainstay of the Wiring Integrity Program during depot level maintenance at ARSC (see Figure 3). It was once used only on the HH-65s but is now being used on C-130, HU-25 and HH-60s. The DIT-MCO system verifies wiring quality and wiring configuration by performing voltage and resistance measurements. This process verifies proper wiring and identifies the shorts and opens in faulty aircraft wiring. TestStats™, a wiring failure tracking program, will be used in conjunction with our wiring testing and analysis to track wiring failures for trend analysis. Other efforts include the identification and procurement of handheld wiring analysis equipment to be used at ARSC and at the air stations.

Figure 3. H-65 during DIT-MCO testing.

Wiring Corrosion

Wiring and cannon plug corrosion prevention has become a major issue for Coast Guard aircraft (see Figure 4). Battelle Institute's evaluations have shown that the use of Corrosion Prevention Compounds (CPCs) such as MIL-STD-81309 Type III products on cannon plugs help reduce corrosion and increase avionics reliability. CPCs are now being used at ARSC's Avionics Repair Shop on all outgoing avionics sub-systems. Other products such as Avdec connector wraps, gels and antenna gel gaskets are also being used on aircraft to prevent corrosion. The Avdec antenna gel gaskets have reduced corrosion under antennas and in turn reduced inspections on HH-65Bs by over 18,000 man-hours a year (see Figure 5).

Future efforts include the use of new technologies such as arc-fault circuit breakers, improved CPCs, insulation repair, smart wiring, and the improvement of training and wiring manuals. Arc-fault circuit breakers prevent electrical arcs, which can produce aircraft fires (see Figure 6). Traditional circuit breakers trip due to thermal effects instead of power transients. Smart wiring will allow us to have on board sensors for the wiring. These sensors will provide indications of wiring problems before they become safety issues. These future efforts will help provide a safer and a more robust wiring system for all Coast Guard aircraft.

Reliability Centered Maintenance Program

The Reliability Centered Maintenance (RCM) Program is an integrated functional part of the Aging Aircraft Branch. RCM is an organized procedure designed to monitor the reliability of aircraft components by utilizing historical maintenance data and statistical methods. Experience has shown that this technique is an accurate method of evaluating the reliability of aircraft systems and components. The program monitors the performance of aircraft components continuously, and brings problems and deteriorating trends to the attention of Coast Guard aviation systems management. The program determines whether preventive action is needed if the inherent reliability of components is not realized.

Conclusion

The success of the Aging Aircraft Branch rests on its ability to integrate the talents of the branch's personnel and to acquire the resources to address aging aircraft issues. One way the Aging Aircraft Branch is doing this is by tapping into the existing experience of industry, academia and government. The branch is a primary member of the Joint Council of Aging Aircraft (JCAA), an organization comprised of the Armed Services, the Federal Aviation Administration (FAA) and the Defense Logistics Agency (DLA). The focus of the JCAA is to leverage each Service's talents and resources, and to provide guidance to the Council's steering groups in the

Figure 4. HH-60 Cannon Plug Corrosion.

Figure 5. Avdec Cannon Plug Wrap and Gel.

disciplines of corrosion, wiring, avionics and dynamic components. The branch is also an active member of the Deputy Undersecretary of Defense's Corrosion Prevention and Control Integrated Project Team (CPC IPT). A direct result of the aforementioned GAO study, the CPC IPT is charged with completely assessing the effects corrosion has on DoD, and now DHS assets. Finally, the Aging Aircraft Branch is currently in the process of becoming an active member of the European Council on Structural Health Monitoring (ECSHM). The ECSHM is a newly formed consortium interested in evaluating new technologies that pertain to extending the life cycle of European air, land and sea assets.

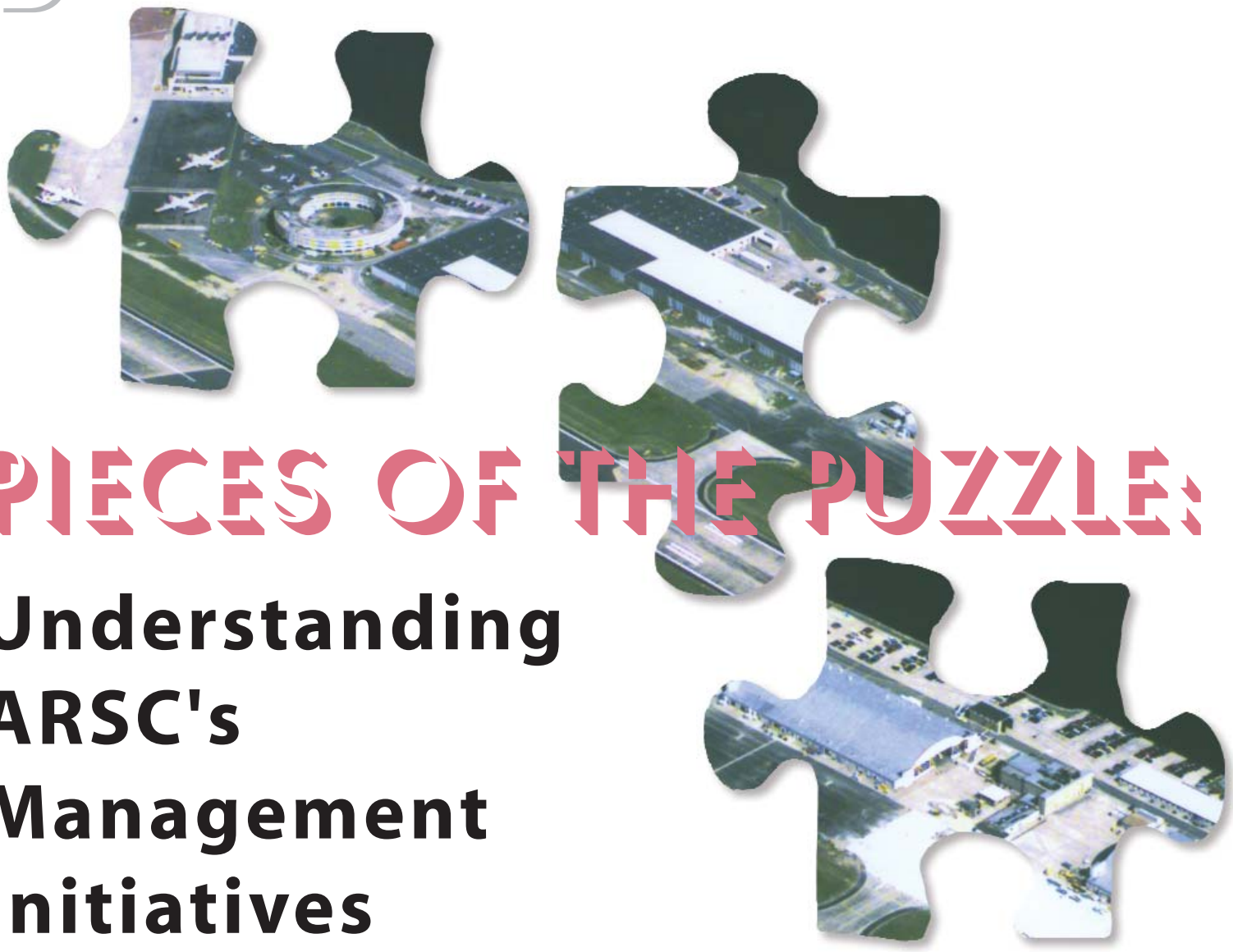
The Aeronautical Engineering community has a long history of being extremely innovative in order to fulfill the operational commanders' requirements, while balancing scheduled and unscheduled maintenance. The establishment of the Aging Aircraft Branch is a definite means to this end.

Figure 6. Arc-Fault Circuit Breaker.

Contacts

The Aging Aircraft Branch is customer focused, we welcome input from the field. Questions, comments or concerns should be directed to the following:

Aging Aircraft Branch Chief	LCDR Mark Ward	(252) 384-7260	mward@arsc.uscg.mil
Corrosion Program Manager	CWO Paul Cassese	(252) 335-6953	pcassese@arsc.uscg.mil
Reliability Centered Maintenance	CWO Randy Jones	(252) 335-6007	randyjones@arsc.uscg.mil
Wiring Integrity Program Manager	Mr. Keith Stevenson	(252) 335-6759	mstevenson@arsc.uscg.mil
NDI Program Manager	Mr. Rusty Waldrop	(252) 335-6935	rwaldrop@arsc.uscg.mil
Materials Engineer	Mr. Sam Benavides	(252) 335-6123	sbenavides@arsc.uscg.mil



PIECES OF THE PUZZLE:

Understanding ARSC's Management Initiatives

by **Christi Yoest**
of Grant Thornton, LLP

In today's fast-paced business environment, one hears the many management buzzwords that promise to improve quality, reduce cost, streamline and integrate. Cost savings, process improvement and quality assurance are common objectives that many organizations seek. The sound application of the right management techniques, in the right combination, by the right people will result in fulfilling those objectives.

The Aircraft Repair and Supply Center (ARSC) has a strategic vision to improve the overall organization and ARSC's leaders are undertaking several well-known initiatives to improve the quality of products and services that ARSC provides to its customers. These methods are Activity Based Costing/Management (ABC/M), International Organization for Standardization (ISO) 9000, Six Sigma, Balanced Scorecard and Commandant's Quality Award (based upon the Malcolm Baldridge National Quality Award). These five management methods are highly complimentary and achieve the collective purpose of improving the organization. Together, these programs constitute elements of an overall integrated performance management framework.

Before showing the integration of these management techniques, let's briefly explore each piece of the puzzle.

Activity Based Costing/Management

Activity Based Costing (ABC), like traditional cost accounting, is a cost allocation methodology. That is, the costs incurred by an organization are allocated to its products or services. However, unlike traditional cost accounting methods, ABC operates on the premise that activities cause costs through the consumption of resources, and the demand for products causes activities to be performed. By assigning costs in this manner, ABC provides managers with the ability to determine the costs of individual activities and processes. This allows for the opportunity to increase their understanding of business processes and identify areas of inefficiency. By understanding the cost and performance of activities within their organization, leaders and managers will develop valuable insight into how their organization truly operates. Therefore, ABC allows managers to sharpen their focus on the continuous improvement of business processes and product or service outputs.

ISO 9000

The ISO 9000 standards are produced by an international consensus of countries with the aim of creating global standards of product and service quality. These standards form a quality management system and are applicable to any organization regardless of its product, service or size.

ISO 9000 is primarily concerned with quality management. In the ISO 9000 context, the standardized definition of quality refers to all those features of a product or service that are required by the customer. Quality management is defined as what the organization does to ensure that its products or services satisfy the customer's quality requirements and complies with any regulations applicable to those products or services.

Six Sigma

Six Sigma is a business philosophy focusing on continuous improvement, based on a statistical measure of variability. In a service or manufacturing environment, a Six Sigma process would be virtually defect free. In a million operations of a process, Six Sigma allows only 3.4 defects. Most companies operate at four sigma, which allows 6,000 defects per million operations of a process. The Six Sigma method is based on the **DMAIC** model:

- ✘ **D**efine, identify, prioritize and select the right projects
- ✘ **M**easure the key product characteristics and process parameters
- ✘ **A**nalyze and identify the key process determinants
- ✘ **I**mprove and optimize performance
- ✘ **C**ontrol to hold the gains

Organizations using the Six Sigma methodology typically achieve significant cost reductions.

Balanced Scorecard

The Balanced Scorecard provides a framework for translating an organization's vision into a set of performance indicators. These indicators are dispersed over four management perspectives: Financial, Customer, Internal Business Processes, and Learning and Growth. Indicators are used to monitor an organization's progress toward achieving its goals and objectives. Using the Balanced Scorecard, an organization tracks its current performance in terms of financial fitness, customer satisfaction and business process results, in addition to its efforts to learn and improve by reengineering processes, and motivating and developing its workforce.

Commandant's Quality Award (CQA)

The Commandant's Quality Award is a Commandant sponsored program that encourages management excellence by providing a framework for assessing performance and improvement opportunities, and identifying best practices. It is based upon the same criteria as the Malcolm

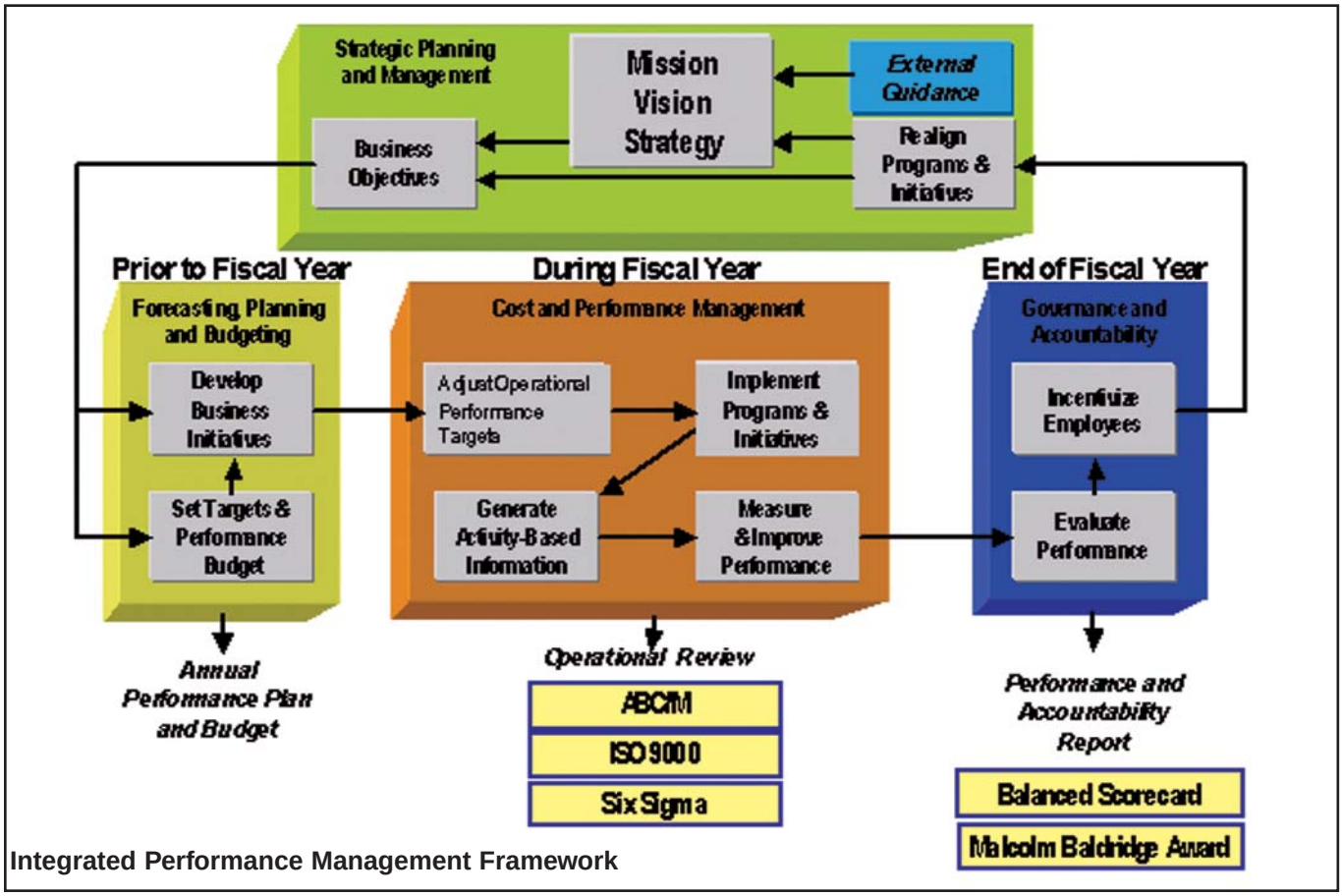
Baldridge National Quality Award, which was established in 1987, but has been slightly modified to better represent unique public sector circumstances. The Malcolm Baldridge Award recognizes U.S. companies for their achievements in quality and business performance, and to raise awareness for the importance of quality and performance excellence as a competitive edge. The Baldridge Award was envisioned as a standard of excellence that would help U.S. companies achieve world-class quality.

The Commandant's Performance Excellence Criteria (CPEC) provides a systems perspective for managing an organization to achieve performance excellence. It is a framework that any Coast Guard organization can use to improve overall performance. Seven categories of leadership, strategic planning, customer and mission focus, measurement, analysis and knowledge management, human resource focus, process management and performance results make up the award criteria.

There are four CQA award levels for deserving organizations: Honorable Mention, Bronze, Silver and Gold. The award is given to an organization that has shown it has an outstanding system for managing its products, services, people and customers. Evaluation for the award includes examination of an organization's system of quality assurance based upon specific quality improvement and customer satisfaction results.

Putting the Pieces Together

Each of the five management methods described fits into an overall performance improvement framework, which when fully achieved, will become the ARSC approach to conducting business. Individually, each element improves some component of performance within an organization, using a slightly different focus and approach. The strategic combination of these efforts is what creates the greatest impact for ARSC. As depicted below, fusion of these complimentary initiatives forms a system of integrated performance management for ARSC.



Integrated Performance Management Framework

Beginning with the *strategic planning and management* phase, ARSC leadership regularly meets to articulate its mission and vision for the future. This includes both long and short-term goals and objectives. The strategic vision is what guides the execution of the management plan throughout the fiscal year. It also dictates how different management initiatives will fit into the overall integrated framework for performance improvement and cost management, and postures ARSC for realization of its strategic vision.

The strategic plan drives the *forecasting, planning and budgeting phase*, wherein ARSC develops its business initiatives, prepares budgets and sets targets for performance. Leadership also decides what performance improvement efforts it will undertake throughout the fiscal year and allocates appropriate funding.

During the year, ARSC divisions execute their budgets, and measure against targets, making adjustments as needed. Activity Based Costing provides leadership with information that enables managers to make informed decisions regarding resource consumption by providing transparency into the costs of individual activities. ABC aids managers in identifying inefficient processes and unneeded activities. This compliments the objectives of ISO 9000 and Six Sigma.

ISO 9000 is a quality management standard that focuses on meeting and exceeding customer requirements through continual process improvement. ARSC passed the ISO 9000 certification audit and was formally certified in March 2004. Our ISO compliant business system is the platform for standardization of any newly developed or re-engineered processes brought about through other quality improvement programs such as Six Sigma.

The Six Sigma program is being investigated and strongly supported in the ARSC Masters environment as an industry standard. Captain Drahos, the Commanding Officer at ARSC, commented that employees who achieve this certification would become change agents for the organization. They will help guide the organization through the challenges of adjusting to new management practices, such as Activity-Based Costing/Management and Balanced Scorecard.

Finally, plans and actions are evaluated *(governance and accountability)*. The Balanced Scorecard acts as a dashboard that monitors the overall status of organizational health in terms of financial performance, customer satisfaction, internal business processes, and organizational learning and growth. This scorecard provides management with a view of ARSC's state of performance in an overall management framework.

The Commandant's Quality Award criterion evaluates ARSC's implementation of its integrated management approach. In its focus on quality assurance, this award is only granted to organizations that have an outstanding system for assuring the quality of its products and services while at the same time successfully managing people -- its employees and customers. The award program also forces a company to examine its customer satisfaction results and the progress of improvement initiatives it has undertaken. ARSC previously received the CQA (Silver level) in 2001 and 2003 and awarded the Gold in 2004.

As the puzzle forms a picture, we see that the synergy of the whole is greater than the sum of the individual initiatives. Strategic planning followed by accurate forecasting, planning and budget exercises set the stage for the fiscal year. Operational cost and performance management techniques like ABC/M, ISO 9000 and Six Sigma help the organization perform to its highest potential. In terms of accountability, the Commandant's Quality Award and the Balanced Scorecard report on the organization's performance results in terms of customer satisfaction, internal process improvement, internal learning and growth, and overall financial health. After evaluating performance, ARSC can then realign its programs and initiatives in the next round of strategic planning, as the integrated performance management cycle continues. As ARSC succeeds in fully implementing this system of cost and performance integration, it gains a reliable tool with which to continuously improve the organization and realize its strategic vision.

Aviation Logistics Management Information System - Database Replication


Hurricane Isabel September 2003.

by CDR Peter Weddington and
Steve Peck
ARSC, Information Systems Division

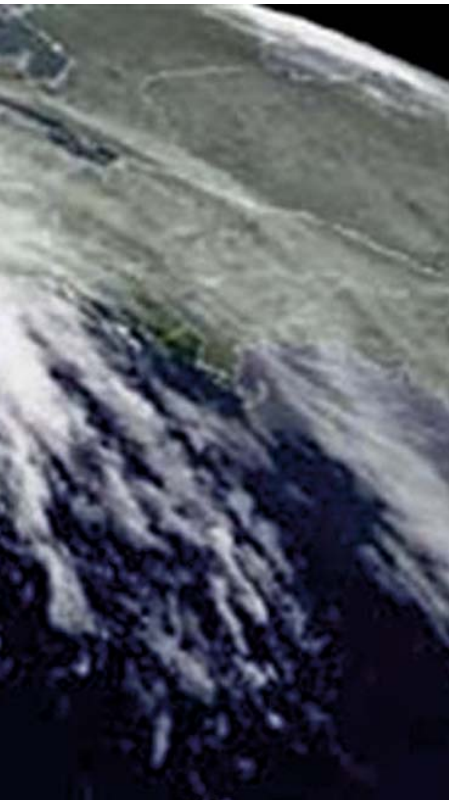
How does a major information system support a multitude of competing system-level requirements and still be a useful product? Disaster recovery, system maintenance, system upgrades, transaction-based processing, transaction-based reporting, business intelligence, business analytics, automated reporting, manual reporting and external interfaces are all vital functions required of a complex, integrated business information system.

This very problem was faced and solved for the Aviation Logistics Management Information System (ALMIS). The Information Systems Division (ISD) at the Aircraft Repair and Supply Center (ARSC) was tasked with meeting the following objectives:

- Enhance the customer experience.
- Meet the availability requirement of 98%.
- Sustain system performance.
- Increase system reliability.
- Improve data redundancy.
- Address multiple, unique business practices.
- Develop scalability to handle more users.
- Adapt to external interfaces.
- Meet information system security mandates.
- Attend to all financial audit findings.

Over the course of 17 years of operation on various platforms, ALMIS has evolved to encompass applications that integrate with the daily business processes and practices of the aviation program to include operations, training, configuration management, maintenance management, supply chain management, procurement management and financial management. Major milestones began with the implementation of the Aircraft Computerized Maintenance System (ACMS) in 1987. The Aviation Maintenance Management Information System (AMMIS) was implemented in 1994. Both of these systems are now business applications within the ALMIS architecture.

The ALMIS Project, which ran from 1997 to 2002, has elevated the aviation business solution to the next higher level of technical and business prowess. The ACMS and AMMIS databases were merged to form the ALMIS Database in July 2000. Peak concurrent sessions hit 200 at the time. In July 2002, the ALMIS Database was upgraded in terms of hardware, operating system, database engine software and configured to hold 3,000 concurrent sessions -- peak load hits continue to reach 280 concurrent sessions. The implementation of the ALMIS Electronic Aircraft Logbook (EAL) and continued user growth beyond the aviation program has concurrent ses-



Item	Cost	Comments
Direct Employee Cost	$10,000	250 people @$40/hr
Indirect Employee Cost	$20,000	500 people @$40/hr
Employee Recovery Cost	$20,000	250 people @$40/hr @2hrs
Non-employee Expenses	$5,000	Material expenses
Client Service Value	$50,000	Operational/Creditability
IT Recovery Costs	$5,000	IT Staff Restoration
Total	**$110,000**	**Cost/Hr ALMIS Downtime**

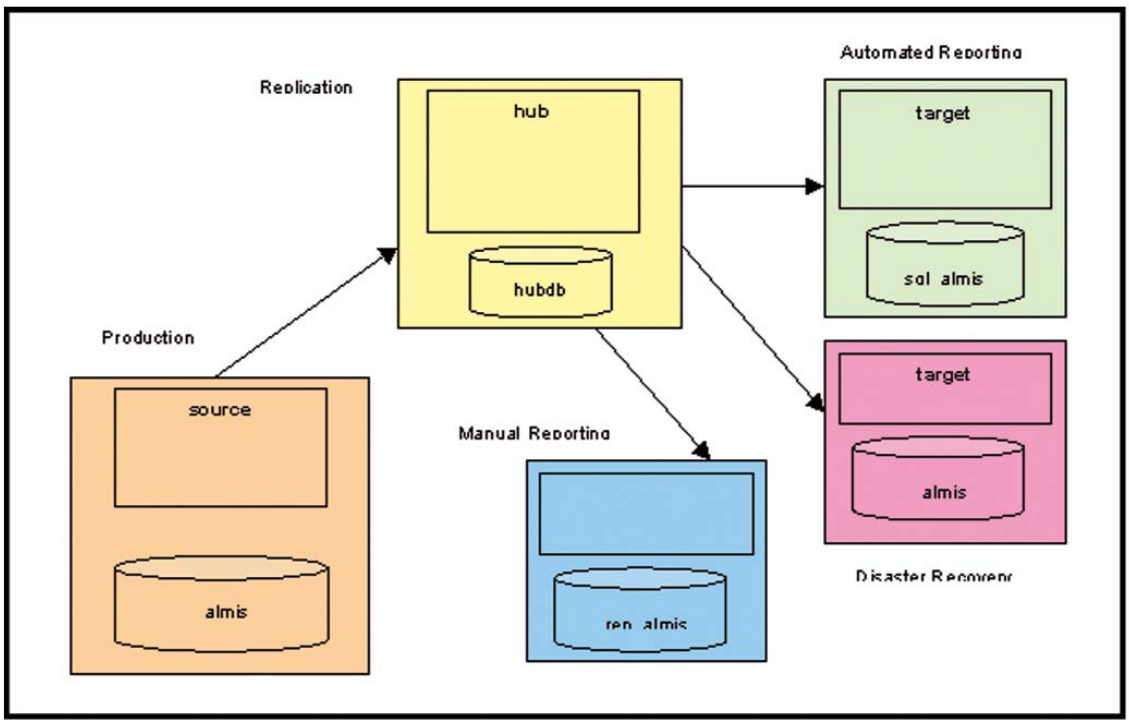
The cost of one hour of downtime.

sions projected to peak at 750 by 2005. The business integration achieved through ALMIS has moved from being administrative in nature to an operationally focused system. Meeting and exceeding system availability goals is a key technical objective to maximize business benefits. Unscheduled downtime is devastating to business practices and customer confidence. A simple costing model helps frame the cost of ALMIS downtime. This model fails to fully account for missed opportunities in the political arena and the full potential impact from natural or man-made disasters. Over the past three years, ISD has been evaluating methods and tools to meet the objectives faced by ALMIS.

With ALMIS firmly established in its upgraded and enterprise compliant architecture, ISD began the next evolutionary step with the ALMIS Database in July 2003 with the acquisition of database replication software, High Volume Replicator (HVR) from PSB based in Amsterdam, the Netherlands. In order to address all the objectives, the visionary attainment of a larger, virtual database from a single, physical database was the technical solution. The compilation of gradual technical upgrades, business practice improvements, and organization maturity created the environment essential to implement the capabilities of HVR to achieve the virtual database vision. The virtual database balances and meets both business and technical requirements. Transaction-based processing is focused on the primary database. HVR is used to create multiple, replicated databases to address the rest of the objectives.

So what is replication? Replication is copying a database, and three methods exist to achieve this capability. The first method is deferred replication. Changes are captured and sent to the target database in the background as messages. Latency or delay does exist between the source database and the target database as the messages are assembled, transmitted, disassembled,

The virtual ALMIS database.



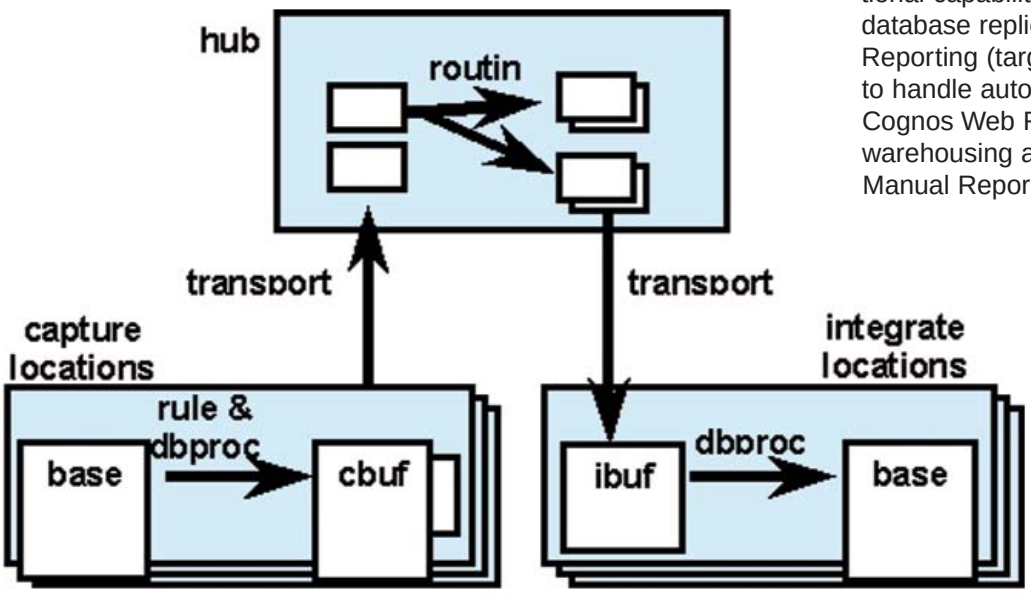
and integrated into the target database. The second method is refresh replication. The source database periodically sends all of its data to the target database. This method is clumsy, introduces significant latency, and can add significant overhead to the system. The third method is direct replication. Transactions are processed simultaneously on the source and target databases. This method requires a two phase commit and any outage in the network make this a nightmare solution to maintain. The optimal method for ALMIS based on both business and technical requirements was deferred replication and HVR supported this method flawlessly.

The HVR software provides significant advantages and key functionality that has allowed for the realization of a virtual database supporting ALMIS. Advantages and functionality such as minimal overhead, processing speed, network compression, ease of use, heterogeneous (e.g., Ingres >> Oracle) capability, customizations and compare/refresh made HVR a viable solution. Using a single source database, three target (replicated) databases were designed and implemented using HVR to achieve the virtual database vision.

How does the technology work? The source database is outfitted as the capture location. A pair (one active and one inactive) of capture buffers (cbuf) is established for each table (base) to be replicated from the source database. Capture database rules/triggers (rule & dpproc) write into the active capture buffer as the user makes changes to the source database. HVR simultaneously processes the inactive capture buffer. A capture rule determines which buffer is active and inactive through the use of a toggle table. The contents of the capture buffer are assembled into a message and transported to the hub database. The contents of the capture buffer are truncated to prevent data duplication. Data is compressed and a special commit algorithm is used so that interrupts do not cause data loss. From the hub database, the message is routed and transported to each of the target (integrate locations) databases for processing. The message is disassembled and placed into the integrate buffer of the target database where an integrate database procedure is executed to process the transaction against the base table.

The capture, transport and integrate technology in HVR is used for 889 tables in ALMIS. Accomplishing this process on a table-by-table basis would be impractical, so HVR has the additional capability of channels. Channels allow the grouping of tables to process changes based on business functions and data relationships. Nine channels have been established for ALMIS providing flexibility to address issues of scheduling, error handling, performance, ownership and atomicity. The flow of data moves from the source database to the target databases. Target databases are read only, and data does not flow from the target databases back to the source database.

The designed architecture involves a source database, a hub database and three target databases. Each component plays a distinct and vital role in achieving the virtual database vision. The Production (source::almis) database must have performance consistency. Transaction-based entry, transaction-based processing and transaction-based printing are core functions. Customers that become frustrated at this entry point never enter the data and the effectiveness of the system is marginalized. Access to this database is strictly controlled through well-designed and tuned user interfaces. The Replication (hub::hubdb) database automates the capture, routing and processing of data changes. It provides additional capability to tune, audit, resolve and refresh database replication issues. The Automated Reporting (target::sql_almis) database is designed to handle automated reporting applications such as Cognos Web Reports, Cognos Powerplay, data warehousing applications and legacy reports. The Manual Reporting (target::rep_almis) database is used for manual query operations, command line access and refreshing non-production environments with realistic data for testing, analysis and troubleshooting. The Disaster Recovery (target::almis) database is used to meet offsite disaster recovery requirements, produce static backups and address external interface obligations.

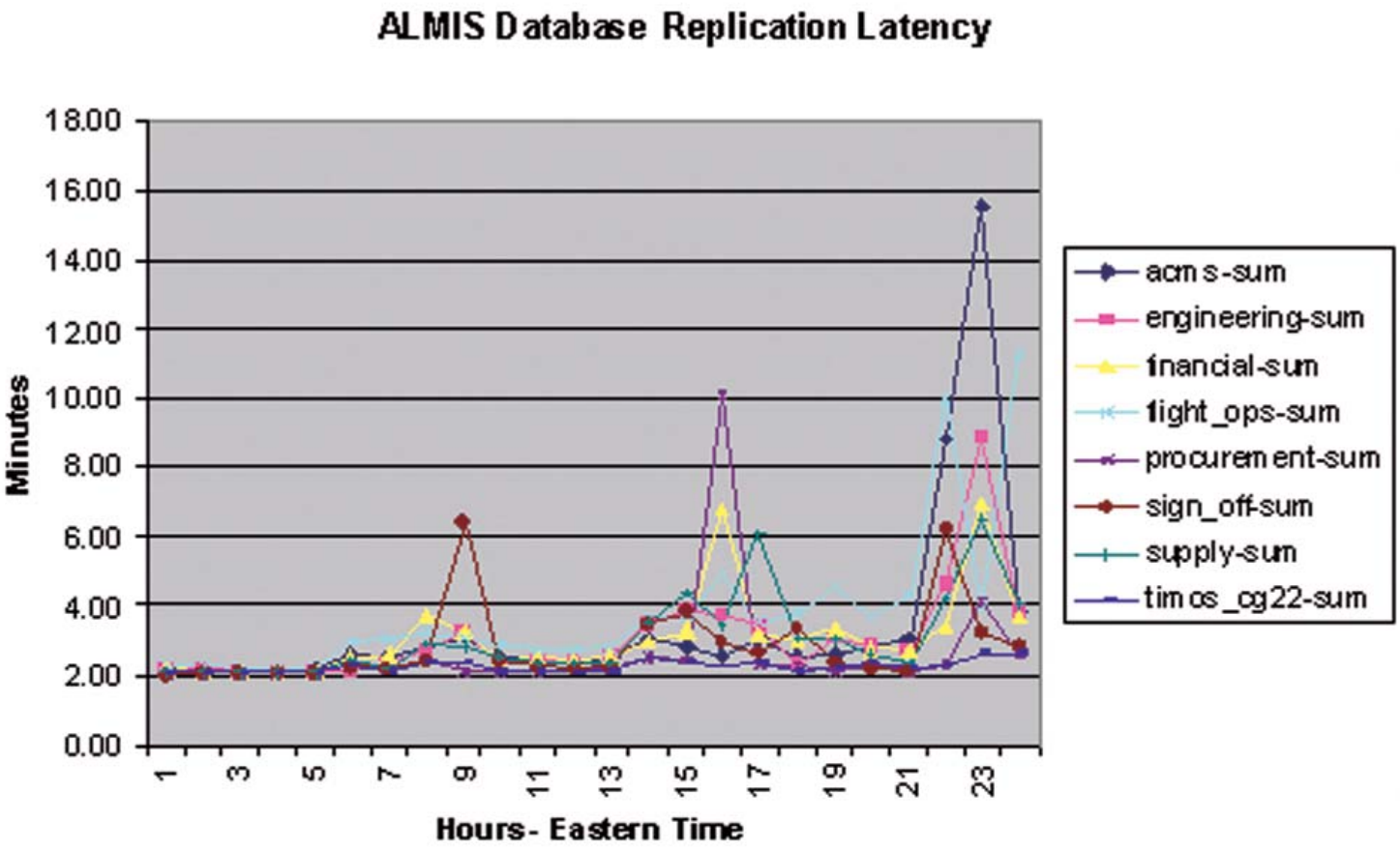


The implementation of HVR has been extensively evaluated and tested. It has gone through four separate testing environments. Transactions were and continue to be audited to the row/column level. PSB/HVR is an internationally recognized company and solution used by major corporations and final institutions to meet their data replication needs. HVR has built in transaction logs, error logs and critical error logs that are continuously monitored by system technicians. Additionally, during each scheduled downtime for ALMIS a comparison is performed between the source database and the target databases to ensure the integrity of the database structures and data in all components.

Deferred replication does introduce the issue of latency. Latency is the period of time it takes to replicate a data change in the source database to the target database. In other words, how old is the copy of the data that one may be looking at in a target database. The graph indicates the average latency time in minutes for each of the channels of ALMIS over a 24-hour period, with the average latency of 10 minutes being advertised.

Minimizing latency has been a primary objective with this architecture. The use of multiple channels has facilitated the distribution of latency. System loads such as peak user load at 0900, batch supply processing at 1630 and nightly database checkpoints at 2200 affect latency. For the Disaster Recovery database the performance of the network between ARSC and the Operations Systems Center adds additionally latency. The latency is monitored and periodically tuned to improve performance. An average latency of 10 minutes is outstanding when considering the inherent latency in the daily business practices requiring non-transaction-based data. Data entry for ALMIS relies on human intervention, which has a latency all of its own. Sensor captured (real-time) data automatically entered into ALMIS is for future visionaries to contemplate. For now, transaction-based input and output are kept on the production database and the rest is distributed based on business practices.

How does a major information system support a multitude of competing system-level requirements and still be a useful product? Database replication through the implementation of HVR is the solution for ALMIS. This low cost, highly capable solution has allowed ALMIS to advance to the next level of performance consistency. It has enabled consistent database performance to all customers executing various business practices through load balancing, error detection, disaster recovery, system tuning and system monitoring capabilities achieving the virtual database vision. HVR is one of many components that completed the virtual database vision that was attained through long term planning, structured processes, systematic improvements and plenty of teamwork.



Leading Coast Guard Aviation into the Future with 2D Barcoding

by **Terry Boyce and**
Dan Beals
ARSC, Engineering and Industrial Support Division,
Flight Safety Critical Aircraft Parts (FSCAP) Office

Introduction

The investigative section at the U.S. Coast Guard Aircraft Repair and Supply Center (ARSC) in Elizabeth City, North Carolina, is working with the National Aeronautics and Space Administration (NASA) and private contractors to develop a methodology and process for permanently marking Flight Safety Critical Aircraft Parts (FSCAP) within the Coast Guard Aviation Fleet and parts inventory. ARSC has completed two pilot programs that successfully marked hundreds of FSCAP with 2D Barcoding Symbology. Implementation of this technology will significantly benefit aviation's flight safety program and logistics management processes.

Background / History

In July of 1996, ARSC personnel were invited to the Boeing North American Facility where a demonstration on 2D Symbology marking technology was being held. The demonstration included marking different types of metals, plastics, paper, cloth and even a bird feather. At the conclusion of this demonstration, ARSC personnel were convinced that this technology would be an excellent tool to mark aviation parts in an effort to prevent future acquisitions of unapproved aircraft parts. Additionally, it would make tracking of FSCAP easier, faster and more accurate for all maintenance and logistics personnel.

In 1997, the U.S. Coast Guard signed a contract with Boeing North America to conduct a pilot project for implementing a 2D Symbology based program within Coast Guard aviation. This pilot project, termed "Phase I," included the identification and marking of five-hundred (500) aircraft parts. It also included the integration of the project's bar-coding system with the Coast Guard Aviation Maintenance Management Information System (AMMIS). The pilot program ended in June 1998 and, with all of the project objectives met, was considered a great success. This project received significant attention from the Airline Transport Association (ATA), the Department of Transportation Inspector General's Office, the Department of Defense, the Federal Aviation Administration (FAA), the Federal Bureau of Investigation (FBI), and many airline manufacturing and transportation companies. Additionally, several articles published in newspapers and magazines praised the Coast Guard for being the lead agency for the implementation of this new technology.

With the successful completion of Phase I and the realization of the potential benefits in utilizing the 2D bar-coding technology; ARSC proceeded forward and conducted joint research with NASA Engineering personnel in pursuit of finding a method/process to permanently mark FSCAP for the entire life cycle of a given part. Through this joint endeavor, it was determined that the permanent direct marking of aircraft parts could be done by various means including laser etching, laser bonding, dot penning or one of several other types of permanent direct marking methods. The type of marks would be directly related to and driven by the characteristics of the part and its environment. NASA agreed to perform all of the pre-marking engineering necessary at no cost to the Coast Guard.

Benefits of 2D Barcoding

Permanent 2D Barcoding will benefit the Unapproved Parts Program in that the marking of aircraft parts with this technology will ensure a part can be permanently identified and prevent unmarked parts from being sold as approved parts. Some examples of where the U.S. Government has found unapproved parts on commercial aircraft:

- The Department of Transportation auditors found 76 airline accidents and incidents where bogus parts were a factor and 521 general aviation accidents and incidents were due to bogus parts. (What's wrong with the FAA? *US News and World Report*, June 26, 1995).
- An FAA report noted that bogus parts were the cause of 166 accidents between 1973 thru 1993. (Report on Aviation Safety, Association of the Bar of the City of New York Aeronautics Committee).
- Bogus parts; including fakes; used parts sold as new or refurbished and new parts sold for unapproved purpose; have found their way into the inventory of every major commercial airline in the country. (Warning! *Business Week*, June 10, 1996).
- The Department of Transportation (DOT) audited 14 repair stations and found 43% of new parts and 95% of parts obtained by parts brokers had insufficient documentation -- they were deemed to be bogus, unsafe or unauthorized. (What's wrong with the FAA? *US News and World Report*, June 26, 1995).
- In October 1994, a pilot was killed in Longmont, Colorado when a bogus propeller failed in mid-flight.
- In September 1994 in Oklahoma City, a Cessna 175 crashed on takeoff, killing two people. The NTSB investigators found that bogus engine bearings led to the accident. (Warning! *Business Week*, June 10, 1996).
- The problems associated with non-conforming, defective and counterfeit aircraft parts are legion since a single domestic passenger airplane alone can contain as many as 6 million parts. Industry has estimated that as much as $2 billion in unapproved parts are now sitting on the shelves of parts distributors, airlines and repair stations. (The Aircraft Safety Act of 2000).

In order for us to keep one step ahead of unscrupulous vendors, we must employ methods to prevent bogus and unapproved parts from entering our inventories. 2D Barcoding technology provides a permanent tamper-resistant identification, which will greatly assist in the prevention of illegal activities of the many unsavory individuals found in the aviation parts supplier world, and it will be a tremendous asset in the detection, prosecution and conviction of the individuals who manufacture, repair, overhaul or sell unapproved aircraft parts within the aviation community. Utilizing this permanent marking technology, we will have more prosecutable evidence of criminal conduct, thus ensuring a better than average chance of prosecution and conviction of those individuals who produce unapproved parts or services. Note: ARSC's Investigative Section has a 100% conviction rate on unapproved parts cases. 2D Barcoding will enable each agency to automatically capture and update historical data for any given part and eliminate human error during the parts processing procedures. An additional major benefit with implementing this technology is that it greatly enhances the logistics support system by providing for improved inventory management and parts accountability. Capturing this information within the Aviation Logistics Management Information System (ALMIS) will result in improved Supply Chain Management and optimize the execution of CG aviation's ICP (Inventory Control Point) budget.

"Read Through Paint" technology was one of the Firsts for this project.

With Congressional encouragement, the Coast Guard began Phase II on 6 December 2002. ARSC Investigative Section, NASA Marshall Space Flight Center, RVSI Symbology Research Center, Monode Marking Inc. and the University of Tennessee Space Institute Material Laboratory gathered at ARSC to begin marking parts for the HH-60 Jayhawk Helicopter and other Coast Guard aircraft. The marking portion of this program was successfully completed on 1 May 2003. The team marked several hundred flight safety critical aircraft parts with several types of Data Matrix symbols. Additional marks were applied to HC-130J aircraft parts. Five magneto-optic read through paint markings were also applied to HH-60 Jayhawk airframes. Lastly, the team marked an HU-25 Falcon jet aircraft frame to obtain high altitude and high-speed analysis.

On 17 November 2003, Data Acquisition and Interface studies began. The object of this phase was to ensure that the data matrix software would not only gather the required data, but also be able to call up and update the AMMIS and ACMS (Aviation Computerized Maintenance System) applications within ALMIS. Additionally, the applied marks were evaluated to determine how well the marks had survived under actual operating conditions. All of the marks were found to read at a grade "A" level, the same grade as when the marks were originally applied. As such, Phase II was determined to be a success in January 2004. The project culminated with the approval and release of NASA Standards - 6002 to Aerospace Parts and the NASA Hand Book - 2003.

Project Milestones

This program has been marked by a number of technical firsts. These include but are not limited to the following:

- ❑ The first use of the laser bonding process to mark FSCAPs.
- ❑ The first use of a fully integrated mobile marking cart in the field.
- ❑ The first use of a hand held laser to mark products in the field.
- ❑ The first use of color additives in conjunction with deep electro-chemical etch and laser coating removal processes to improve marking contrast.
- ❑ The first read through paint markings applied to commercial products.

The barcode reader/scanner not only reads and scans the mark, but actually photographs the marks enabling the engineers to study the environmental effects without having to be at the physical location of the part and allows the part to be evaluated without having to be removed from the aircraft.

Commercial Aviation and Other Government Agencies following the Coast Guard's efforts

Following several briefings from ARSC's Investigative Section to DoD Agencies, DoD issued a new policy mandating application of a Unique Identifying Mark to the following:

- ❑ Effective January 2004, equipment item's whose acquisition cost is greater than $5,000 and less than $100,000 shall be uniquely marked for accountability purposes. If the acquisition cost is less than $5,000, it should only be uniquely marked if the item is mission essential or a controlled item. If an equipment item's acquisition cost is greater than or equal to $100,000, the item shall be uniquely marked and the acquisition cost shall be captured in an Automated Information System (AIS) supporting asset management.
- ❑ DoD considers the implementation of unique identification to be a strategic imperative, necessary to efficiently move supplies to war fighters.
- ❑ It will enhance logistics, contracting and financial business transactions supporting U.S. and coalition troops; enable DoD to consistently capture the value of items it purchases, control these items during their use and combat counterfeiting of parts. It will also enable the DoD to make appropriate entries into its property accountability, inventory and financial management information systems toward achieving compliance with the Chief Financial Officers Act (Federal Register, 30 December 2003).

Future

Having successfully completed Phase II, the next step in the progression towards automatic aircraft parts tracking will be directed towards marking the remaining FSCAP in the U.S. Coast Guard inventory. To accomplish this task, the Coast Guard's current plan is to invest in its own marking and reading equipment. The marking equipment will be installed at ARSC along with readers/scanners. The parts could then be marked as they come in from vendors and air stations and non-Ready for Issue parts could be marked prior to being sent out for overhaul or repair. As time permits, the remaining items on the shelf at ARSCs' warehouse would be marked. In order for the Coast Guard to stay in line with the DoD, Other Government Agencies and the worldwide commercial aviation community, implementation of this process is a necessity. With the proven success of marking FSCAP, the Coast Guard should consider expanding the process of 2D Datamatrix Symbology to include the surface fleet, small arms, sensitive weapon systems components and tools.

The Aircraft Repair and Supply Center accepted the challenge back in July of 1996 to implement a program that would aid in the prevention of acquiring unapproved parts, and these efforts have proven to be far reaching; helping to create new government policy and making all of the aviation community much safer! At the Aircraft Repair and Supply Center, we're totally committed to working towards our Vision …

"We keep 'em Flying" by providing the RIGHT STUFF, at the RIGHT PLACE, at the RIGHT TIME, at the RIGHT COST ... EVERY TIME!!

HH-60J Maintenance Training Unit

by CWO Monty Everson
ARSC, HH-60J Projects Cell

The Coast Guard's Aviation Technical Training Center (ATTC) in Elizabeth City, North Carolina, has driven the requirements for the development of a Maintenance Training Unit (MTU) based on the HH-60J systems. The value of this requirement was identified early in 1991 when ATTC started course development and initial airframe familiarization training in response to the implementation of the new HH-60J Jayhawk helicopter. However, due to very limited resources available at the time the Coast Guard (CG) was unable to provide an MTU. As the CG struggled through budget cuts and force reductions in the 1990's, the HH-60 MTU never quite made it to the starting gate. Realizing the critical need for actual hands-on experience required to properly meet the training needs for the highly technical field of aviation maintenance, ARSC's HH-60J Product Line and ATTC teamed to develop a short term fix to this vital requirement. The solution required the loaning of operational HH-60s to the schoolhouse on their way to their next Programmed Depot Maintenance (PDM) period. While this interim solution has mitigated some of ATTC's training needs, it has placed an ever-increasing burden on our already strained operational fleet of 42 HH-60s. A long-term solution was needed.

The MTU started its life as a SH-60B Seahawk owned by the U.S. NAVY. Its last unit was Helicopter Anti-Submarine Squadron Light HSL-49 at Naval Air Station North Island, San Diego, California.

The Navy wiring harness has been removed prior to strip. Note tail cone is from another scrap HH-60 aircraft. ARSC removed the tail cone and completed all repairs and modifications to the tail prior to its reinstallation.

Fast forward to the year 2002. A small team from the Coast Guard Aircraft Repair and Supply Center (ARSC) and ATTC move on a lead that they had received regarding the disposition of a derelict SH-60B airframe in Troy, Alabama. After initial inspection revealed that it was just that, a thoroughly stripped SH-60 without a tail or any other part that was retained by hardware. Being the thrifty CG mechanics that they were, they made a quick deal (read: free!) and worked out the logistics of getting it to Elizabeth City. When the airframe arrived aboard a truck it had a tail cone and tail pylon but all three sections were from different donor aircraft. To put this into perspective for all of you non-aviation types, it would be like going to an automobile wrecking yard and getting a totally stripped Corvette body and shipping it to your home ... talk about your basket case! After the airframe was delivered, the realization hit home of just how hard it would be to get the necessary parts to build this shell of an aircraft up to a training unit that replicates a fully operational HH-60J. With being in the middle of a war and the H-60 being a staple in military aviation, there just isn't a lot of spare parts available.

Now the CG had the beginning of a long-term solution, but still had no funding or labor to get it going. Upon establishment and funding of the HH-60 Service Life Extension Program (SLEP) in summer 2003, ARSC finally had the resources needed to begin work on the MTU. SLEP was established as a comprehensive deliberate approach to replacing, reworking, modifying key fittings, structures and wiring that have degraded as normal wear and tear associated with 14+ years of CG operations. SLEP will be conducted in conjunction with the next (3rd) Programmed Depot Maintenance (PDM) cycle. In order to keep up with operational demands of the fleet, ARSC will need to induct an additional aircraft in to the PDM cycle to offset the increased scope of PDM caused by SLEP. This additional aircraft will come at the expense of the operational HH-60 that has been traditionally lent to ATTC for training. Therefore, completion and delivery of the MTU before SLEP begins is key in allowing for the additional operational HH-60 needed in the PDM, while still meeting the schoolhouse's training needs without adversely affecting the availability of the operational fleet. The bottom line: completion of the MTU is the first step in a successful SLEP for the HH-60.

This is an artist's rendition of the future cockpit of the HH-60 upon completion of the Avionics Upgrade.

To handle the management and production of the MTU, the HH-60 Product Line Projects Cell was assigned the project in May of 2003. In addition to the MTU project, the Cell was tasked with managing two other very large projects; the implementation of a new state of the art avionics suite for the legacy HH-60 and the identification and development of structural enhancements associated with SLEP. These

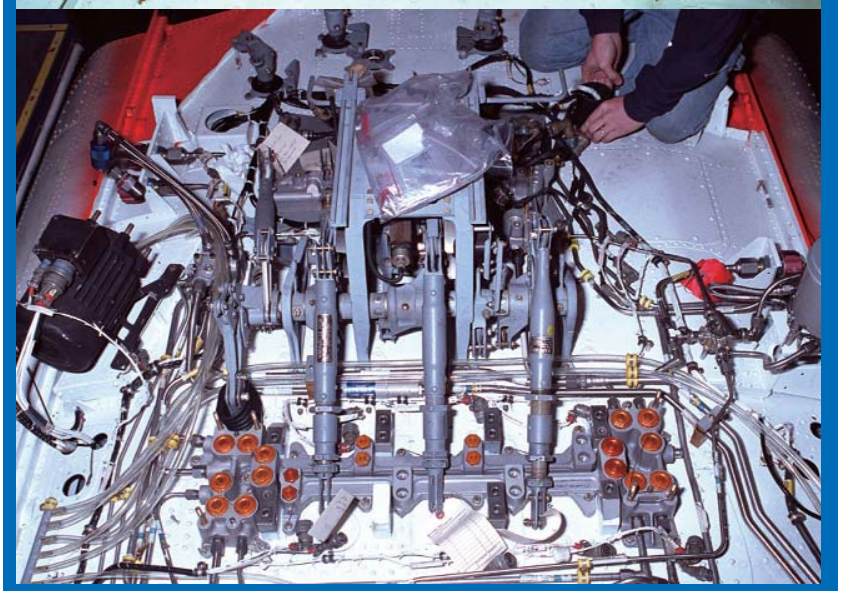
Now designated as CG6096 the MTU has viewing areas built into the airframe to aid in technical training. These viewing areas will be illuminated internally to aid the ATTC staff while training a group of technicians. This picture was taken after the hull modifications and the intermediate paint phase were completed. The tail pylon is now hung and folded for flight control installation.

daunting projects are necessary to extend the HH-60's airframe life out to at least 2022. Because the Projects Cell was only funded for one O-4 and one CWO to handle all of these projects the rest of the staff was stood up with an excellent team of contractors. The labor is paid for directly out of the Avionics Upgrade and SLEP Projects budget.

In August of 2003, the SH-60B husk was moved from the hangar at ATTC to the HH-60 Production Line at ARSC. The first order of business was to have all of the old SH-60 wiring harnesses removed (they are not at all similar to the HH-60J). The MTU Project Lead (contractor) then coordinated closely with the H-60 PDM Planner to place the MTU into a schedule that does not effect production of the operational HH-60 aircraft PDM line. The MTU was chemically stripped, then brought into Hull Rework. Hull is where the MTU is repaired and modified to an HH-60J configuration. Turning an SH-60B into a HH-60J has been an interesting and demanding task for the crew to say the least.

To the casual observer it is hard to tell the difference between the MTU and its operational twin in the next bay. The MTU has been built up with a repaired fire-damaged wiring harness out of an operational HH-60J and it incorporates over 140 electrical and avionics faults that can be induced by an ATTC instructor for system troubleshooting training. Most of the assembly has been completed with used non-airworthy parts (condition F) whenever possible. To acquire these parts the MTU staff has used good ole' CG ingenuity to find assets from the other services scrap or excess inventories. Visiting Defense Reutilization and Marketing Offices (DRMOs), other Department of Defense (DoD) aircraft trainer assembly sites, ATTC training aids, etc., and generous cooperation from the HH-60 Supply Cell at ARSC is the only reason the MTU is still on schedule.

Production steams on at a steady pace, only if the parts keep coming in ahead of the mechanics building this one-off trainer. This has been very time consuming for the MTU Project Lead and staff. Despite these challenges the MTU is on track to be delivered to ATTC the first week of August 2004, realizing the achievement of a 14-year goal to have a dedicated HH-60J trainer. This device will pay for itself in short order bringing the



Here are some 6096 before and after pictures. This is typical of the quality and dedication of the MTU crew. Attention to detail and adhering to proper build-up procedures is evident in this project. It is hard to tell that this is a training device at first glance. The MTU hydraulic and electrical system will be fully operational for training. However, it is impractical to have operating pneumatics or drive train components in a training device. The power train is installed for static training only.

enhanced perspective our young technicians need and with that, the aircraft availability required by the fleet. Furthermore, it will mark the start of a time of major transition for the HH-60 Product Line as it prepares to accomplish SLEP and the Avionics Upgrade for the entire HH-60 Fleet for the next five to six years.

The MTU is typical of the one-off projects ARSC is capable of and of which the dynamic world of Coast Guard Aviation demands. This may have started out of necessity, but there is a considerable amount of pride and craftsmanship built in to the MTU by its crew. It's very evident that there is no other facility that the CG could have tasked to produce the MTU for the limited funds and resources invested. This trainer will be a maintainable and modifiable asset for ATTC for years to come. In fact, the MTU will return to ARSC during the mid-production run of the SLEP and avionics upgraded HH-60Js to be converted to this new airframe configuration. This will ensure that ATTC will have a viable tool necessary to properly train our HH-60 workforce of the future. The MTU Project is yet another example of how the CG excels at helping themselves.

The HH-60J nose assembly was built completely from scrap from the HH-60J PDM line. There is some incredible metal work involved with scratch building most of these parts. A contract maintenance team has completed this build-up with a staff of five to nine members.

Aircrew System Advisory Panel Delivers ASAP

by CDR Paul Lange
ARSC, Deepwater Division Chief

The entire Coast Guard HH-60J helicopter fleet must upgrade obsolete avionics. The aircraft is unsupportable after 2010. The Jayhawk helicopter has served Coast Guard aviation and by extension the American public extraordinarily well for 15 years. But the cockpit is due for an upgrade. Do you have electronic equipment in your home that has not been updated in over a decade? The Deepwater Program recognized that the HH-60J would remain a workhorse for Coast Guard aviation and that aging equipment and new missions demanded renewed investment.

To get the biggest bang for the buck from the Deepwater investment, the Coast Guard HH-60J avionics upgrade project has gained outstanding synergies and total ownership cost reductions by partnering with the U.S. Army. The Army Special Operations Command in concert with Rockwell Collins has developed an HH-60 avionics upgrade called Common Avionics Architecture System (CAAS). The CAAS glass cockpit is state of the art with an open architecture capable of technology refreshment to sustain the system beyond 2022. The

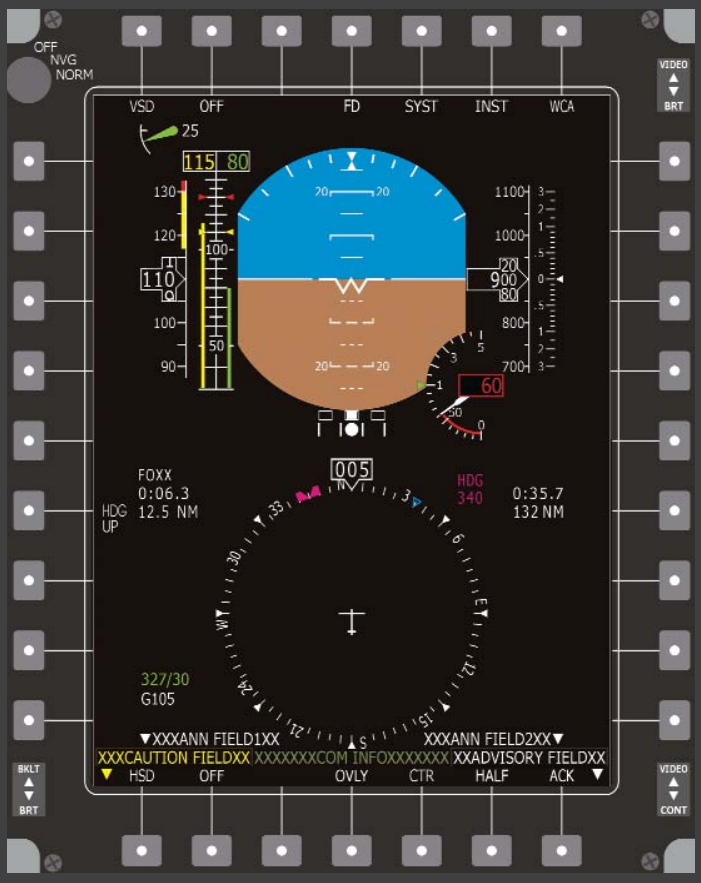
Legacy HH-60J Primary Flight Display.

old

new

Flight Deck Operational Requirement for the HH-60J Primary Flight Display.

Army SOF MH-60 CAAS Primary Flight Display.



mission of the Army Special Forces HH-60, however, is very different from the Coast Guard Medium Range Recovery mission. The CAAS cockpit had to be adapted to meet Coast Guard helicopter aircrew requirements.

The Coast Guard Office of Aviation Forces chartered four HH-60J pilots to form an Aircrew System Advisory Panel (ASAP). Their mandate was to modify the Army CAAS cockpit to meet Coast Guard culture and missions. The deliverable was a Flight Deck Operational Requirements Document (FDOR). The Army's FDOR was 1,776 pages of technical drawings and specific design details. The ASAP was given less than five months. Their work on the ASAP was in addition to their regular duties as instructor pilots at their home Air Stations.

The ASAP had to balance two mutually exclusive constraints:

1) The HH-60J has never had a major mishap, most aircrews believe the cockpit is close to perfect now, therefore make the new cockpit look and feel exactly like the old cockpit.

2) Every change you make to the Army CAAS cockpit costs money for software integration, do not stray from the CAAS baseline.

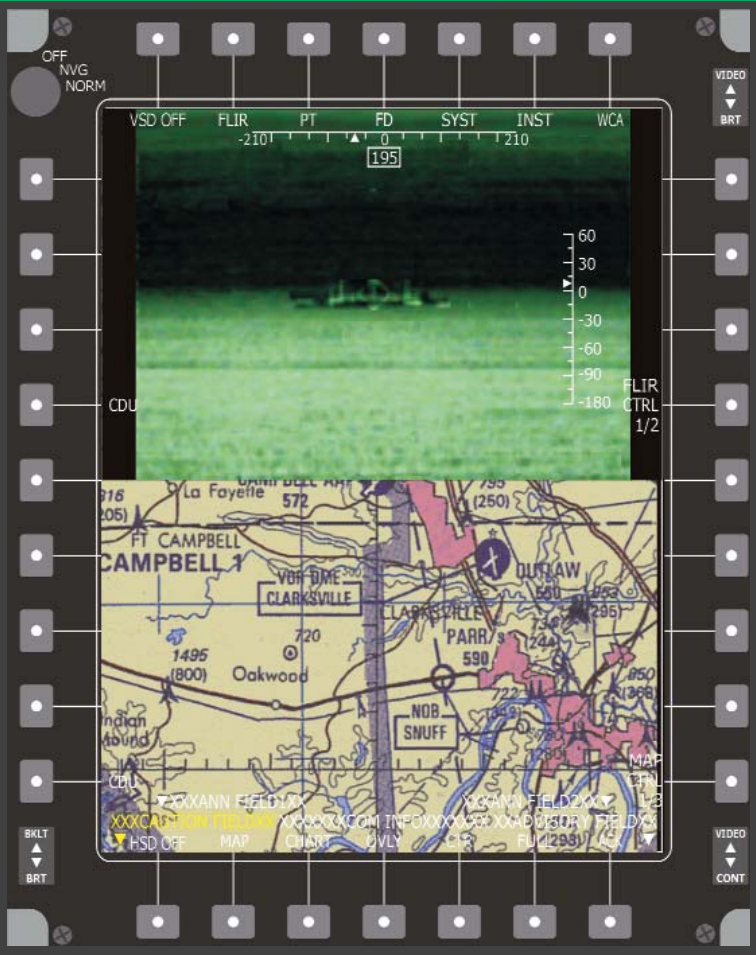
The baseline CAAS primary flight displays used graphic user interfaces to reproduce their MH-60 cockpit flight instruments and performance gauges on Active Matrix Liquid Crystal Displays (AMLCD). Airspeed and barometric altitude were displayed as a tape. The attitude gyro and radar altimeter were size challenged. The engine power turbine (Np) and main rotor (Nr) performance instruments were missing from the primary flight display.

The ASAP determined that the differences between the CAAS baseline primary flight displays and the Coast Guard HH-60J instrument panel were irreconcilable. Drawing from the Rockwell Collins library of other designs and human factors experts at NAVAIRSYSCOM at Patuxent River, the ASAP redesigned the primary flight display to more closely match the legacy HH-60J instrument panel.

The flight instruments were converted to traditional gauges. The attitude gyro was enlarged and spread across the display. Because of the night over water hovering mission of the HH-60J, the radar altimeter was enlarged with several low altitude alerting features added. The Np and Nr instrumentation, known as a triple tach, was incorporated within the display.

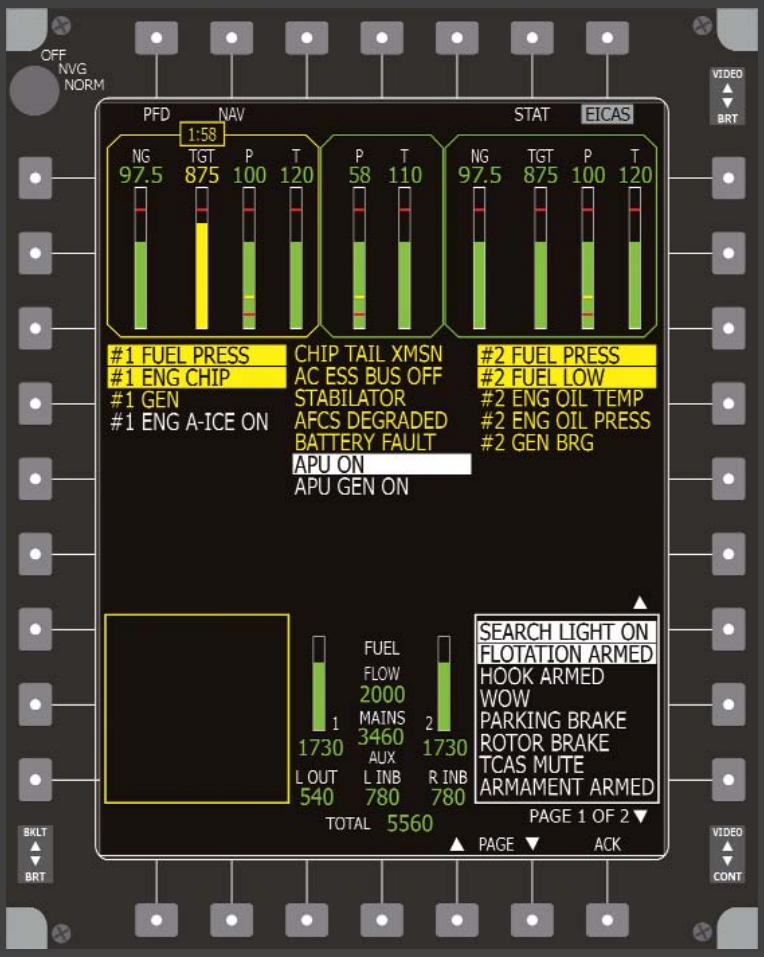
Because of the multiple sensors and weapon delivery systems on board the Army MH-60, the CAAS cockpit uses five AMLCDs across the dashboard to display information to the pilots. The Army Special Forces pilots wanted each 6x8 inch glass to display in a half page format. This means that the CAAS dashboard is actually ten 3x4 inch displays. The Coast Guard does not require this multiplicity option. The ASAP preferred a full screen display of radar, Forward-Looking Infrared Radar (FLIR), Electro Optical or hoist camera images.

The flight planning, communication, navigation and flight manager designs were only modified incrementally. The ASAP inserted HH-60J specific communication, encryption and navigation equipment into existing page formats. If changes to these pages become necessary after test and evaluation on the hot bench at Cedar Rapids, Iowa, and a quarter dome simulator at Patuxent River, Maryland, then software squirts can correct them at controlled costs. Rockwell Collins is the



Army Half Screen.

Coast Guard Full Screen.



Coast Guard Engine Instrument and Caution and Advisory Page.

industry leader in flight planning and flight manager systems. The Coast Guard ASAP and the Army Cockpit Working Group were not eager to make spurious changes to a fielded, successful and well-tested system.

The CAAS baseline design for temperature, pressure and fuel quantity gauges presentation differed from the legacy Coast Guard HH-60J gauges mostly in their relative size. The Coast Guard accepted a smaller gauge that could be inserted within the caution and advisory page. The tape gauges have digital readouts and change colors as the gauge transitions through normal operating ranges (green), precautionary ranges (yellow) and minimum/maximum ranges (red). When a gauge enters a precautionary range that requires monitoring, an exceedence timer becomes visible above the gauge to record the time. A failed gauge has a red X superimposed across the face.

A completely glass cockpit raises the "what if" question of how to deal with a flight in instrument conditions if all five displays fail. Both Army and Coast Guard pilots were concerned with electrical power supply and equipment failures that would plunge the cockpit into darkness. The Coast Guard solution was to install standby and stand alone battery powered flight and navigation instruments for each pilot. The HH-60J avionics upgrade reduces the length and width of the instrument panel, greatly increasing the forward visibility of the pilots.

The ASAP completed the HH-60J Flight Deck Operating Requirement Document on 4 February 2004. The 705-page document was the result of five months work, four winter trips to Cedar Rapids, Iowa to work with Rockwell Collins, and a dozen weekly teleconferences. Their design was approved at the Preliminary Design Review on 25 February 2004. The high tech and high performance cockpit will appear familiar to Jayhawk pilots, simplifying their transition and reducing training time. The ASAP team designed in record time a cockpit for the HH-60J that will replace obsolete equipment and reduce total ownership costs.

CAAS conceptual design showing outboard standby gyros.

A TECHNICIAN'S PERSPECTIVE

of the RDR 1300 Weather/Search Radar.

by LT Tom Engbring
ARSC, Deepwater Integration Office

RDR 1300 Control Head.

Antenna Drive base damaged.

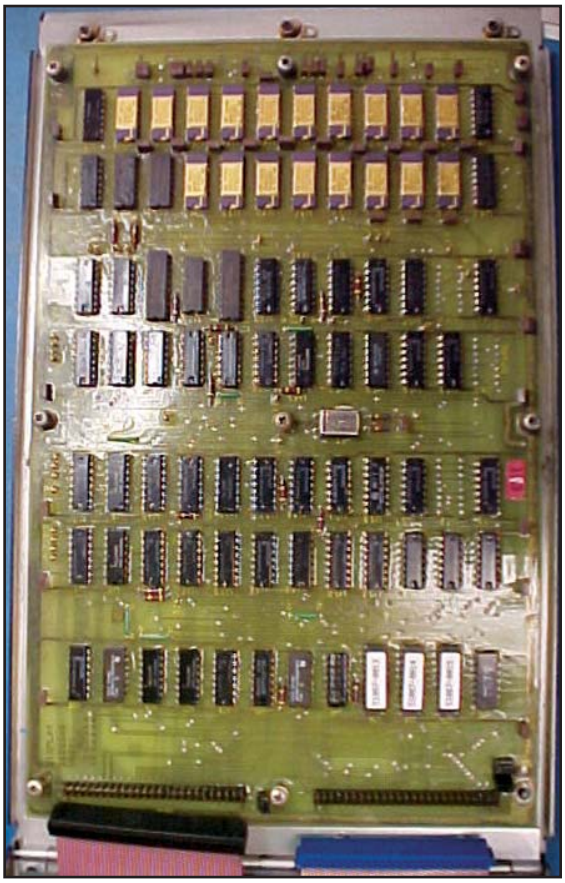
After 20 years of Coast Guard service, it still has a pulse -- well, at least a Pulse Forming Network (PFN) …. The Telephonics RDR 1300 is a 9345 MHz (X-band) weather/search radar, currently installed (via low-level integration) on 96 Coast Guard HH-65 and 42 HH-60 helicopters. The system (original equipment as delivered on these platforms) consists of a Receiver/Transmitter (RT), Interface Unit (IU), Control Head and an Antenna Drive Unit with planar array. A variant (with a combined control and display unit) is also installed on our 27 HC-130H aircraft.

LONG-TERM SUPPORT

As both time and technology march onward, the ARSC Engineering Industrial Support Division (EISD) Avionics Component Repair Shop 233 continues to overcome issues with parts obsolescence and the effects of corrosion, aging, vibration, poor handling, overheating and a host of other detriments to avionics systems. Even though technicians contend the receiver is very reliable, and they have established methods of testing transformers and magnetrons, their concern still lies with availability of replacement parts. Maritime Domain Awareness may not pop into you mind when you're looking for a plastic cover … instead, it usually means that we must research options with the Original Equipment Manufacturer (OEM) or alternate parts suppliers. Another wrinkle in operating such an old system is the corporate changeovers …. Some of the names you find in RDR 1300 documentation might include: Allied Signal, Bendix-King, Honeywell and Telephonics.

HIGH VOLTAGE TRANSFORMER AND PARALLEL INTEGRATED CIRCUITS

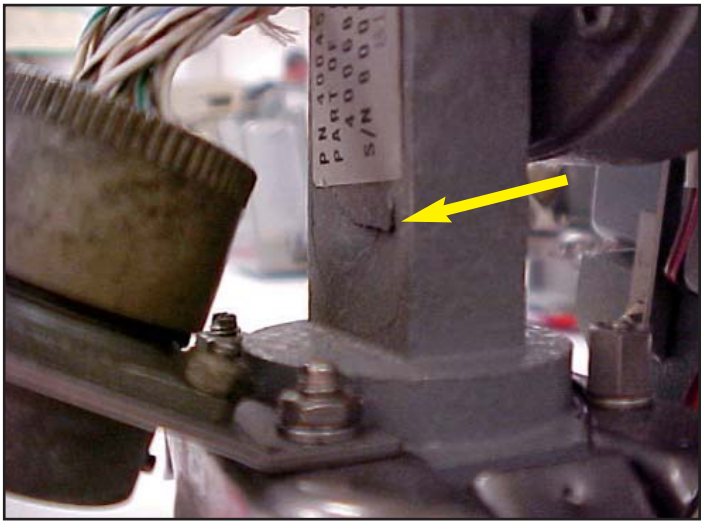
Known trouble areas within the RDR 1300 system have included the Pulse Transformer Assembly (x6 Transformer), T4501 and T4502 Transformers and the IU Video Display Board. Through persistent efforts of HH-65 Product Line Avionics Technical Services personnel and vendor support, the unavailability of x6 Transformers has been overcome. At this point, however, we are facing a critical shortage of the multiple-IC Video Display Boards for the IU. These circuit cards are typically difficult to troubleshoot because of the many parallel ICs. With only five spare boards remaining, the parent company, Telephonics, indicates it is poised to support the Coast Guard. And, although our current plan is to acquire the remaining stock of Video Boards and return a small quantity of broken boards for assessment/repair, a point of diminishing returns could be very near.



Video Display Board.

WAVEGUIDE AND TILT MOTOR

An emerging problem has recently surfaced on the Antenna Drive Unit. Although it is not yet known exactly why the condition exists, it is clear that the electrical connector is being forced into the waveguide feed. This disrupts signal propagation through the waveguide and creates excessive standing waves, unwanted (reflected) video and lower power output -- all contributing to reduced sensitivity and poor performance of the system. The antenna feed may be next on the "critical parts" list. Tilt Motor cover damage is also an ongoing obstacle. Somehow, the motor covers are being forcibly pressed into the motor terminals, which consequently shorts the tilt drive motor.

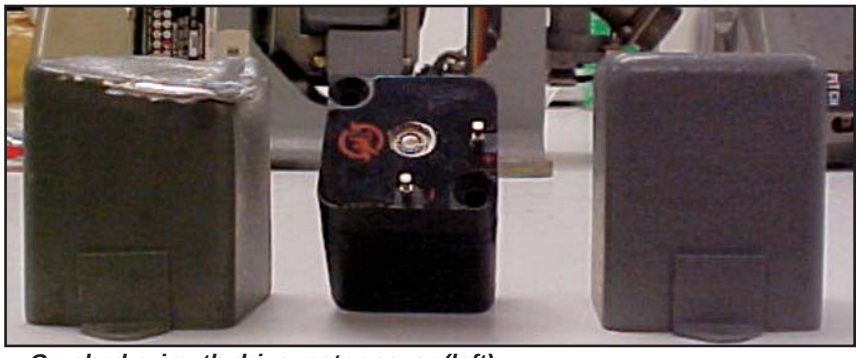


This waveguide feed has been compressed and punctured.

IT'S MORE THAN A RADAR MILE

The next time you jump in the Pilot's seat and flip the radar ON, take a second to consider those who count it a privilege and accept the challenge to support our flight operations from coast-to-coast. Shop 233 technicians continually struggle to salvage parts and come up with innovative ways to keep the RDR 1300 in service. With a support cost of over $580K the past two fiscal years, it's no small matter. So, until funding, planning, engineering, integration prototyping and testing for a new radar system are accomplished, it will be business as usual for RDR 1300 support at ARSC.

Special thanks to: EISD Avionics Component Repair Shop 233: Robert Swain, Sam Wentz, Dawn Bassett and Bill Hurt;
HH-56 Product Line: Dale Holland and Robert Adams; and
Chief Fiscal Operations: Debora McCarty



Crushed azimuth drive motor cover (left).

ARSC BAD ACTORS PROGRAM

Members of the Bad Actors Program.

by **AETC Michael Guillory**
ARSC, EISD Engineering Support Branch Bad Actor Manager

The Aircraft Repair and Supply Center (ARSC) Bad Actors (BA) Program establishes a system to improve the reliability of reparable aircraft parts by identifying and removing them from the ARSC supply pipe line, either permanently or temporarily, those parts determined to be substandard either in reliability or air worthiness. The intent is to increase the Mean Time Between Failure (MTBF) of aircraft parts and increase aircraft availability fleet wide. The goal of the program is to locate and eliminate the 10% of the parts that cause 90% of the down time and repair cost.

What makes for a Bad Actor? This question is always being brought up: "what criteria do you want us to use in the field to base our recommendation on components that should be on the Bad Actors list?" Oh boy, good question! The "criteria" for a Bad Actor is deliberately not set to any standard due to the many changing variables involved. Contained in the Coast Guard Aircraft Repair and Supply Center Instruction, ARSCINST 13070.1, there is a Bad Actor definition that states: "In general, any part that has a history of substandard performance (compared to others of its type) usually due to a high failure rate. However, each part is evaluated on its own merits since there are other factors to consider: initial cost, repair cost, replacement cost, age, number in stock, vendor history, repair history, warranties, etc." In short, it's a judgment call. What the Bad Actor Manager does is look for specifically, a pattern of IDENTICAL or near identical failures, which would indicate the repairs are not solving the problem. The Bad Actors Program requires a cooperative decision between the Product Line BA Point of Contact (POC), Item Manager (IM), Equipment Specialist (ES) and Supply Cell Leader, with final approval by the Chief, Product Line Division, on the best possible disposition of a BA.

If the repairs of a suspected bad actor are being done by a vendor, ARSC first requests a "special evaluation" and makes sure that the vendor is aware of the pattern of repeat problems. ARSC Supply Quality Assurance (QA) will generate a "QDR" (Quality Deficiency Report) based on the Unsatisfactory Report (UR). Once the part is returned from the vendor Ready For Issue (RFI), ARSC will attempt to intercept the part before it ships out in order to perform an acceptance check to confirm its RFI status. Unfortunately, some items can be screened and others cannot, depending on the workload of the Aircraft Product Line(s) or lack of test equipment. ARSC has been successful at intercepting numerous "RFI" parts straight from supply that failed to pass the acceptance checks! If that's the case, there are five choices: send it back to the same vendor AGAIN with a note (repair under warranty); send it to a different vendor (with money); send it to the Original Equipment Manufacturer (OEM) (with lots of money); scrap it; or leave it in the Bad Actor cage until further notice.

If it were decided to send the Non-RFI part back to the company, the OEM that made the part, you would think since they built it they would be able to successfully repair it. In a perfect world maybe, but not this one. Sometimes even the OEM is unable to resolve the problem. There seems to be that 1% that is outside the scope of either the equipment, the technician or both. In several cases, ARSC has been successful in having a vendor modify their test equipment to catch a 1% problem. If the OEM can't fix it, we now have two choices left, scrap it or leave it in the Bad Actors cage.

Placing a Non-RFI part in the Bad Actors cage gives us breathing room as it is out of the supply pipeline but still available if someone comes up with a solution. If the Product Line decides to scrap the item because it is obsolete, excess stock, uneconomical to repair, etc. then we have another two choices, scrap to Defense Reutilization and Marketing Office (DRMO) or scrap to the Aviation Technical Training Center (ATTC) for training purposes.

Remember, we're looking for a pattern of identical or near identical failures. The hard decisions come when a part will have numerous failures that appear to be unrelated to each other and/or with enough flight time between discrepancies for the vendor(s) to claim their last repair for that specific failure worked. There is no easy answer for these types of discrepancies. If the Item Manager has enough spares then it may be scrapped, otherwise it is back to either a vendor or the OEM.

The "Electronic" Unsatisfactory Report (UR) system along with a part's Significant Component History Report (SCHR) are currently the best method for tracking and trend analysis of Bad Actors parts. It is imperative that air stations experiencing a problem with an aircraft part fill out an accurate and timely UR for the data to be useful. It's essential for ARSC's Engineering and Industrial Support Division's (EISD) Quality Assurance (QA) Supply, EISD QA Aircraft and the BA manager review newly created URs daily and compare the UR with a parts SCHR in order to identify a suspected BA before it enters the repair pipeline.

This is why <u>detailed</u> discrepancies write-ups / URs are so important, to determine whether various discrepancies are related, or not. "INOP" does not help a whole lot when the bad actor team is trying to compare discrepancies on a SCHR.

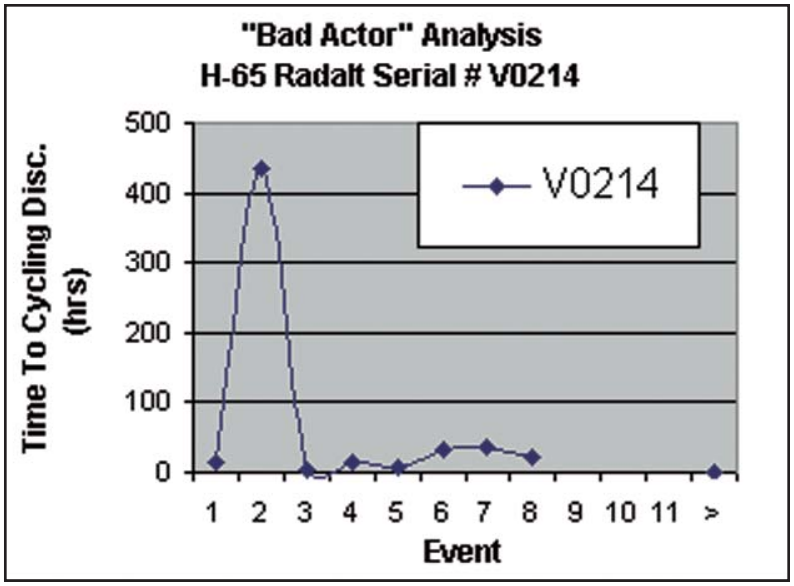


Figure 1. Suspected Bad Actor.

BAD ACTOR SUCCESS STORY: Here is one of many past success stories: During a review of the HH-65 Fuel Quantity Indicators SCHRs, a discrepancy pattern is noticed. A "Failed Item Analysis" is performed (by the OEM) on a sample part. The result is the discovery of an OEM engineering design flaw effecting 36 out of 155 fuel quantity indicators in the HH-65 fleet. A major Safety of Flight issue was discovered and resolved.

Bad Actors are costly due to the fact they require repeated shipments, increase the downtime of operational aircraft, and require extra man-hours for the repair process or cannibalization of aircraft parts. Therefore, at times it may be justifiable, both monetarily and technically, to keep a part out of the supply pipeline while waiting on an evaluation or contractual issue to be solved, providing there is an abundance of spares on the RFI shelf. Besides the AMMIS "Average Repair Cost" there are other Bad Actors costs to consider.

01) Cost to Coast Guard of down aircraft due to installed NRFI part.
02) Cost in time to remove NRFI from aircraft to shop.
03) Cost in time/handling to get NRFI part from shop to Air Station AMO.
04) Cost in time to order replacement RFI part from shop to Air Station AMO.
05) Cost in time/handling to get NRFI part from Air Station AMO to ARSC supply.
06) Cost in dollars to ship part from Air Station AMO to ARSC supply.
07) Cost in time for Air Station AMO to order RFI part from ARSC supply.
08) Cost in handling for ARSC supply (Falls Church) to process NFRI part.
09) Cost in time for ARSC supply to process repair documentation.
10) Cost in time/handling/dollars to ship NRFI item to vendor.
11) Cost of repair by vendor (unless under warranty)
12) Cost in time/handling to receipt repaired item back to ARSC Supply.
13) Cost in handling to store RFI item until needed
14) Cost in time for Air Station shop to order part from Air Station AMO.
15) Cost in time for Air Station AMO to order part from ARSC Supply.
16) Cost of time/handling to ship RFI item to Air Station.
17) Cost in dollars to ship RFI item to Air Station.
18) Cost in time/handling for Air Station AMO to receipt for RFI item.
19) Cost in time/handling for Air Station personnel to install RFI item on aircraft and run-up.
20) Cost to hand carry Priority 2 parts to Canada or Puerto Rico over the weekend to salvage the mission.

In conclusion, a Bad Actor is a part or component that consistently fails to perform as expected. Some of our avionics systems are pushing 20 years old and maybe reaching the end of their useful life. Ask yourself, how much has electronics changed in the last 20 years? If you suspect a Bad Actor, then send the Bad Actors Manager an e-mail with the Serial Number, Bar Code and a description of your problem. The Bad Actors Manager will pull the SCHR, review it and reply to your e-mail.

APS-137 RECAPITALIZATION ACQUISITION PLAN

by LCDR Ed Sheppard
ARSC, C-130 PL Engineer

Introduction

The HC-130H "Hercules" aircraft continues to play a crucial role in supporting U.S. Coast Guard Missions. The adaptability and durability of the HC-130 provides mission planners with great flexibility in assigning missions such as on-scene commander for Search and Rescue (SAR) and Law Enforcement (LE) cases and logistical support flights hauling supplies, equipment and personnel.

A sensor-equipped HC-130H.

Sensors

In recent years, the HC-130H has gained popularity as an outstanding on-scene coordinator based upon its unheralded on-scene endurance (~10-13 hours) combined with its variety of communications options and stable sensor platforms. The endurance of the HC-130 is useful in maximizing search efficiency on SAR and LE cases. The HC-130H is equipped with the APS-137, an Inverse Synthetic Aperture Radar (ISAR). ISAR is a processing system that generates true, recognizable, two-dimensional images of a selected target. These two-dimensional images aid the viewer in recognizing and classifying the selected target.

The APS-137 surface search radar is the primary electronic sensor used to attain the search identification and tracking capabilities of the HC-130H aircraft. The HC-130H is also equipped with a Forward-Looking Infrared Radar/Electro Optical (FLIR/EO) system called CASPER (HC-130 Palletized Sensor Electronics Reconnaissance). While the APS-137 is the primary search tool, the Contact Area Summary Position Report (CASPER) sensor is used to further identify and classify those targets. However, the complete sensor package requires both the APS-137 and the CASPER sensor. Thus, the CASPER sensor is forever linked with the APS-137. The photo above depicts the interface between the APS-137 and the CASPER sensor.

In the photo, a HC-130H uses the APS-137 surface search radar to locate and track the vessel and the CASPER sensor to identify and classify the vessel. Then, the CASPER sensor transfers the data regarding the Target Of Interest (TOI) to a U.S. Coast Guard (USCG) surface vessel and a shore command via satellite for further delineation.

A CASPER equipped HC-130 has been deemed as the "most efficient programmed flight hour in the U.S. Coast Guard today," according to a high level Coast Guard official. Since the APS-137 is the front-end identifier for the CASPER system, its worth is readily apparent as a force multiplier.

Aging, Ailing and Failing System

The APS-137 radar was originally installed in the late 1980's for the current HC-130 series aircraft, the 1500 and 1700 series. Normally, the expected useful life of avionics equipment is between 15 and 20 years. The U.S. Coast Guard obtained these systems used from the U.S. Navy with an average life of about 5 years observed. Therefore, the APS-137 has reached the end of its useful life cycle. In the last few years, the APS-137 has begun to exhibit telltale signs of an aging, ailing and failing system. As true of any cutting edge technology, the APS-137 technology is outdated when compared to currently available systems. Our hangar deck personnel have begun to experience the frustration of maintaining a failing system. Since 1996, the Mean-Time-Between-Failures (MTBF) has continued to trend downwards leveling off in the last two years near the design MTBF of 80 hours as shown in Figure 1.

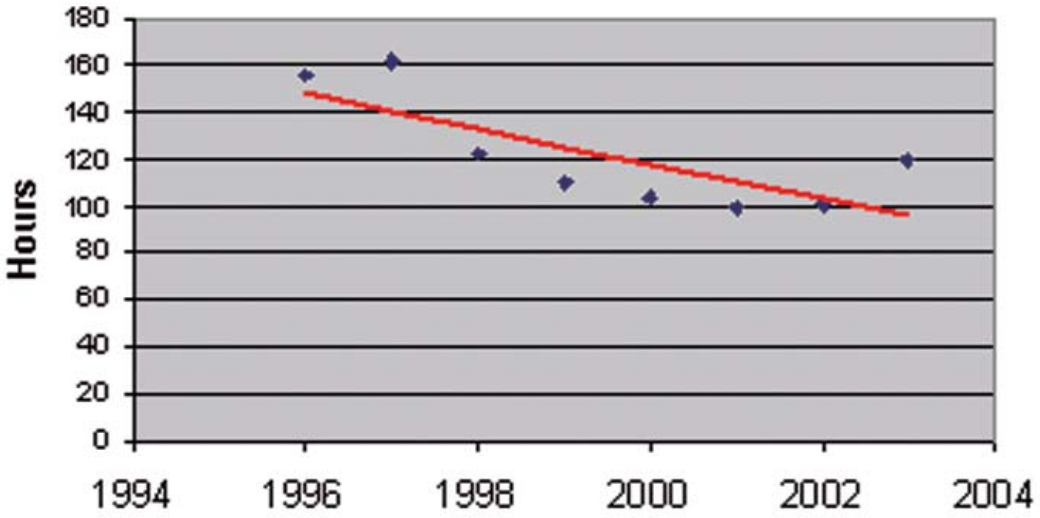


Figure 1. Observed APS-137 System MTBF from 1996 - 2003.

Since C-130 deployments schedule 45 hours per week, we should expect a radar failure every other week for a deployed aircraft. In our current role as members of the Department of Homeland Security (DHS), this level of availability is not sufficient to maintain mission readiness. In addition to MTBF trends, the number of removals, cannibalization rates and dispatch reliability data indicate an aging system. From the support view, the APS-137 is rapidly becoming unsupportable. New radar system components, Shop Replaceable Units (SRUs), are not available since production ended many years ago. Therefore, all SRUs must be overhauled or reengineered. ARSC has aggressively pursued reengineering circuit cards and other internal components. Again, the outdated nature of this technology provides limited suppliers capable of returning successful products. Based upon two recent studies, one from the RCM branch and one from the Naval Surface Warfare Center (NSWC) Crane, Indiana, the APS-137 radar will become unsupportable past Fiscal Year 2008 (FY08). The CRANE study cited that the U.S. Navy will no longer utilize the APS-137 variants. Therefore, this would likely eliminate any potential suppliers to support our version of the system.

Operational Impact

The current support costs of the APS-137 radar system continue to escalate and will require a significant investment in organic capability to essentially stand-up an APS-137 production center at ARSC or system replacement. With our current projections of the MTBF and lack of vendors in 2008, we anticipate the need to invest in those facilities in 2005 to prevent operational gaps to mission commanders in 2008. Figure 2 graphically depicts the need to initiate this project immediately. The blue line shows the current APS-137 systems in the fleet. Notice in 2008 as repair vendors are unavailable, the blue line is expected to drop sharply as we no longer have the ability to repair components and are left to cannibalize parts to keep as many system operational as

possible. The red line shows the expected operational gap to operational commanders in 2008, if funding is delayed to start the project. As the yellow circle clearly shows, we currently expect an operational gap in 2008.

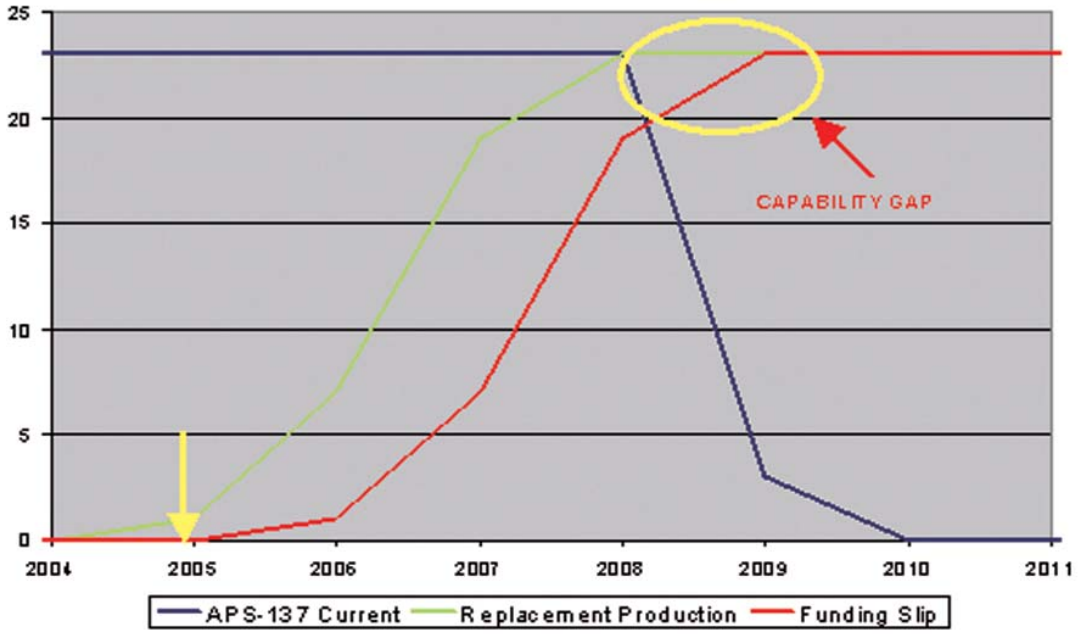


Figure 2. Expected operational gaps without funding for a replacement surface search radar.

Cost Benefit Analysis

We conducted a cost-benefit analysis of continuing to support the current APS-137 radar or purchase a replacement system as shown in Figure 3.

Clearly in Figure 3, the new radar system provides a more economical system with a break-even point in 2015

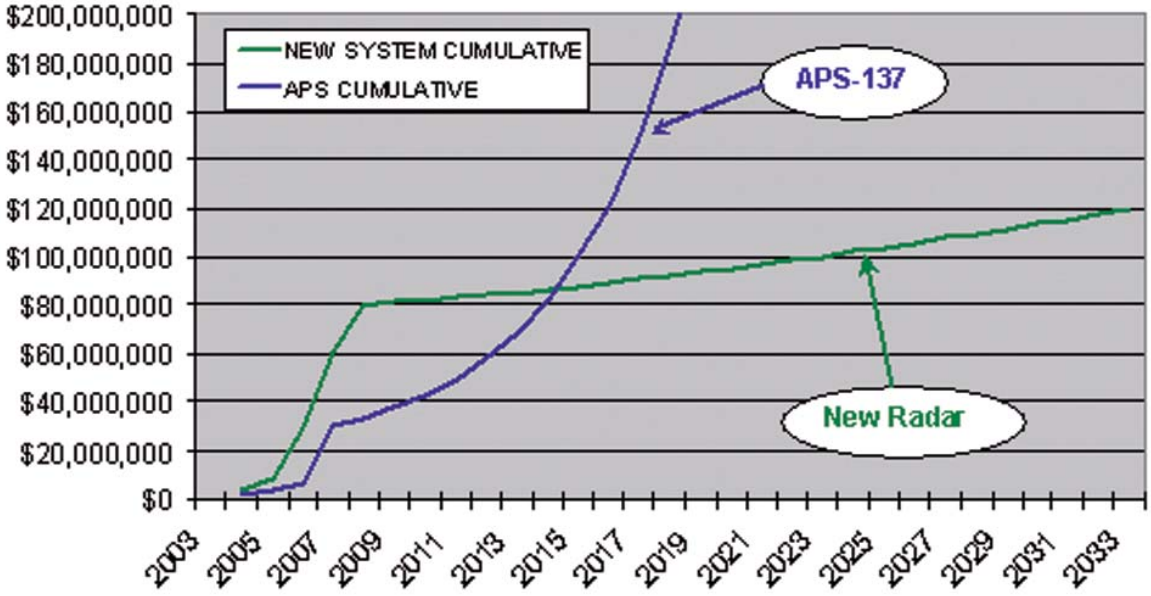


Figure 3. Coast Benefit Analysis between the APS-137 support costs and a new acquisition until 2033.

U.S. Coast Guard Vision

According to the Coast Guard Systems Integrated Near-Term Support Strategy (SINTSS) signed in October 2003 by RADM Brown, Systems Directorate (G-S), and RADM Belz, Operations Directorate (G-O), 27 HC-130H airframes will be required until FY 2033. Currently, commercially available radar systems offer improved reliability and enhanced capabilities. The advertised MTBF on new systems ranges from 800 hours to upwards of 1000 hours, compared with the 80-hour design MTBF of the APS-137. Therefore, the aging, ailing and failing APS-137 radar should be replaced now to ensure proper sustainment of current and enhanced capabilities over the next 30 years.

Engineering Industrial Support Division (EISD), Engineering Support Branch (ESB), Support Equipment (SE) Section at ARSC - Current Initiatives

by Paul Finkenkeller
ARSC

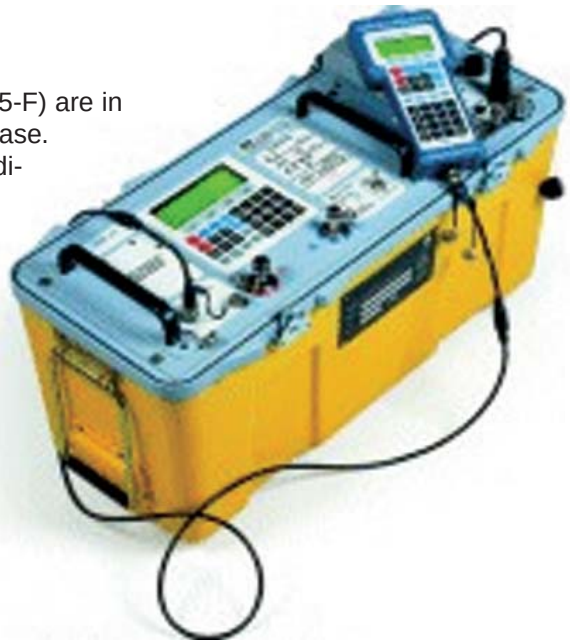
The Avionics and Ground Support Equipment Section is involved in several initiatives that have or will provide the U.S. Coast Guard with upgrades, replacements and or repair options in support of aging aircraft equipment. In coordination with the Prime Units, Coast Guard Air Stations, other Government Agencies and contracting personnel, the Equipment Support Section is working hard to supply, support and sustain the Coast Guard Aeronautical community with up-to-date, cost effective and standardized equipment.

Aeronautical Support Equipment Process Guide
A long awaited Aeronautical Support Equipment Process Guide has been drafted and is in the final review stage and should be available this summer. This Process Guide documents the analysis and planning conducted for Coast Guard aeronautical support equipment. It disseminates the necessary information and defines areas of responsibility required to acquire, account, sustain and maintain Coast Guard aeronautical support equipment. All Coast Guard personnel who operate, maintain or support this equipment shall comply with the approved acquisition, accounting, maintenance and support planning contained within this Process Guide. This Process Guide supports and augments the policies contained in the current Commandant Instructions, specifically the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series).

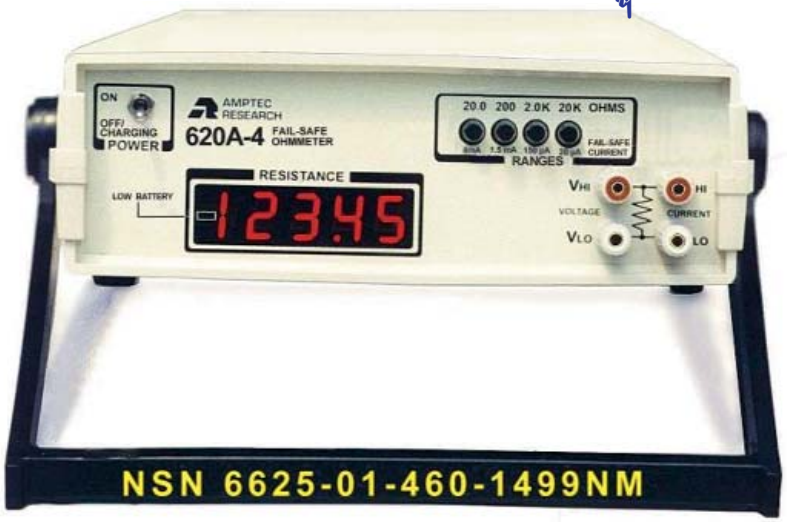
Integrated Logistic Support Plan (ILSP) Review
Engineering Industrial Support Division (EISD) has completed all Aircraft ILSP reviews and provided notification and guidance to all units as to what equipment has been added and/or deleted. An instruction on excess/disposal procedures for equipment no longer required was included in this notification and is available on the Aviation Repair and Supply Center's (ARSC) EISD website at http://cgweb.arsc.uscg.mil/eisd/content/suptequip/esup.cfm.

APM-480 IFF Transponder Test Sets
New ramp IFF transponder test sets (APM-480s) have been fully distributed to all Air Stations. These test sets were part of the initiative to remove and replace legacy equipment while also providing state of the art test sets with more functionality. This test set has inherent upgrade capabilities and we are currently expecting the latest software release, Version 8.x, which should be available soon from Tel Instruments.

Air Data Test Sets
New Air Data test sets (ADTS 405-F) are in the last step of the acquisition phase. This procurement has been coordinated by EISD/ESB through our own Contracting and Procurement Offices. The contract has been awarded with expected deliveries in the spring. These test sets will be provided to all USCG Air Stations as they become available.



Squib Testers
New "USAF/USN Munitions Safety Board" approved Squib Testers have been tested, procured and supplied to each HH-65 unit, replacing the much older General Purpose Ohmmeters/Digital Multi-Meters, thus providing an upgrade as well as greater safety for USCG Aircraft Maintenance Technicians.



Maintenance Assist Modules (MAM) Kits
In furthering efforts to better support the aging pool of Electrical Sub-Assembly Test Sets (ESATS) for the HH-60 community, a study and subsequent purchase of two (2) MAM Kit's was accomplished. These kits provide a unit with a "local" troubleshooting capability hereto for unavailable. These kits are available on a temporary loan basis from ARSC to allow units to troubleshoot and isolate exact causes for failures without incurring expensive Original Equipment Manufacturer (OEM) diagnosis charges, shipping delays and extended timeframes without their test equipment.

Bill of Materials

Assembly: 978-005-12000 — Description: Maintenance Kit, SAC-512 Field Support (MAMs) — Rev: A

Item	Component and Description		Rev	Qty Per	UOM	UNIT "Replacement" Costs	ISC
010	710-000-04000	PCB Assembly, IO Card, Military Version	B	1.00	EA	$2,410.00	M
020	710-000-12002	PCB Assembly, DMU SAC-512, 501	A	1.00	EA	$4,160.00	M
030	710-000-16001	PCB Assembly, Power Board, 1 Amp, DC Inpu	B	1.00	EA	$1,085.00	M
040	710-000-13000	PCB Assembly, 122 Point Switch Matrix	A	1.00	EA	$1,800.00	M
045	710-000-18002	PCB Assembly, Latching Matrix, 128 Points	A	1.00	EA	$1,710.00	M
050	710-000-01003	PCB Assembly, Vprog, Dual 0-40 VDC	A	1.00	EA	$1,615.00	M
	Component Part Notes	DC Input Only				$1,615.00	
055	710-000-17000	PCB Assembly, Steering Card	A	1.00	EA	$600.00	M
060	710-000-15000	PCB Assembly, Controller Card	A	1.00	EA	$6,446.00	M
070	940-340-00001	Power Tray #1 Assembly, SAC-512	A	1.00	EA	$4,265.00	M
080	940-490-00001	Power Tray #2 Assembly, SAC-512	A	1.00	EA	$1,055.00	M
100	710-000-00003	Alignment Tool Assembly, SAC-512		1.00	EA	$650.00	M
110	620-400-00000	Cable Assembly, Data Interface, SAC-512	B1	1.00	EA	UNK	B
120	950-512-00000	Case, Analyzer PCB Spares Storage	A	1.00	EA	$250.00	M
130	940-750-00001	Tool Assembly, PCB Extraction	A	1.00	EA	$845.00	M
140	940-760-00001	Tool Assembly, Front Panel Simulator (SAC-5	A	1.00	EA	$220.00	M
150	940-770-00001	Handle Assembly, SAC-512 Interface Tool	A	1.00	EA		M

Coast Guard Aviation's HF Long Range Communications Improvement Project

9012D ALE Control.

by CWO2 Michael Walsh
ARSC, Engineering & Industrial Support Division
Support Branch

Project Scope The initial scope of this project was to install commercial satellite (COMSATCOM) phones on all aircraft to improve the reliability of their long-range communications. When it became clear, in the post-Iridium world, that the remaining COMSATCOM systems were not going to meet all of the requirements, and be very expensive, the project shifted to High-Frequency (HF) communications improvements. After reviewing the elements of HF communications, it became clear that improving, or eliminating, operator frequency management had the most promise of making Coast Guard (CG) aircraft HF communications more reliable at a reasonable cost. The tool chosen to improve operator frequency management was Automatic Link Establishment (ALE). The military standard HF-ALE radio is widely deployed throughout the US military and provides a viable alternative to overburdened satellite communication systems. Automatic Link Establishment (ALE) is an improvement to HF radio that allows establishment of considerably clearer over-the-horizon voice communications. The Rockwell Collins 309M-1 HF ALE processor and controls are now installed in all HH-60s and C-130s as well as the HU-25C model aircraft. Due to weight constraints, common sortie profiles and money, the HH-65 fleet will not be receiving ALE under this project.

What is HF ALE? High Frequency Automatic Link Establishment (ALE) is a communication system that permits HF radio stations to call and link on the best HF channel automatically without operator assistance. Typically, ALE systems make use of recently measured radio channel characteristics stored in a memory matrix to select the best frequency. The system works much like a telephone in that each radio in a network is assigned an address (similar to a call sign). When not in use, each radio receiver constantly scans through its assigned frequencies, listening for calls addressed to it.

To reach a specific station, the radio operator simply enters an address, just like dialing a telephone number. The radio consults its memory matrix and selects the best available assigned frequency. It then sends out a brief digital message containing the identification (ID) of the destination. When the receiving station hears its address, it stops scanning and stays on that frequency. The two stations automatically conduct a "handshake" to confirm that a link is established, and they are ready to communicate. The receiving station, which has been squelched, will emit an audible alert and/or a visual indication of the ALE address of the station that called to alert the operator of an incoming call. At the conclusion of the call, either operator can "hang-up" or terminate the link.

While in the receive (not linked) mode, the ALE processor continually scans the network to measure the quality on each assigned frequency by listening to the sounding signals from the other stations in the network. The quality scores are stored in a matrix within the processor, listed by the other stations as ID versus channel. When a call to a certain station is initiated, the radio checks the matrix to determine the best quality frequency for the call to that particular station. It then attempts to link on that frequency. If the link cannot be established on that frequency, it will try again on the next best frequency, and so on until a link is established. In the sample LQA matrix be for the station headquarters (HQ), the channel numbers represent programmed frequencies; the numbers in the matrix are the most recent channel quality scores. In this example, scores range from 0 for the worst to 100 for the best.

Thus, if the operator from HQ wanted to call ALPHA 3, the radio would attempt to call on channel 05, which has the highest LQA score. If not successful, it would attempt to call on the channel with the next highest score (channel 04), and so on.

ALE is a tool that automates HF linking and frequency selection. It does not replace a properly trained HF operator. Knowledge of the specific radio equipment being used, propagation, antennas and so forth is still essential to use ALE effectively. ALE will not improve propagation. If poor propagating frequencies are used, ALE will not make them work better. ALE only works as well as the frequencies you put into it; therefore, proper frequency management is still essential. ALE makes the linking process more automatic, allowing a novice HF user to use the radio effectively. However, ALE in some cases takes more time than it would take two highly trained HF operators to establish a link. ALE determines only the best channel to pass traffic and tries to establish a link between radios.

Capabilities Delivered The addition of the ALE processor to the aircraft's current HF system will provide automated frequency management in accordance with MIL-STD-188-141A and FED-STD1045. The Rockwell Collins 309M-1 ALE processor is also compatible with SELSCAN HF link technology. Secure ANDVT capability is fully compatible with the ALE system.

Transition Issues Even with the ALE processor installed, the HF radios on the aircraft can be used in the traditional mode. This allows the aircraft to continue to operate in accordance with current SOP as the CG transitions to an ALE network. With ALE installed and operating, aircraft can immediately participate in the U.S. Air Force (USAF) Scope Command and the U.S. Customs Over-The-Horizon-Enforcement (COTHEN) ALE networks.

The USAF Scope Command network provides a direct, non-secure automated phone patch capability, world wide, to 1-800- and DSN numbers. Currently these automated phone patches are in place and operational at the Operation Centers in Districts 1, 5, 7 and 17; Operation

	Channels				
Address	01	02	03	04	05
ALPHA 1	60	33	12	81	23
ALPHA 2	10	--	48	86	21
ALPHA 3	--	--	29	52	63

Sample LQA Matrix Table.

Centers at Air Stations Cape Cod, Kodiak, Astoria, San Diego, Elizabeth City and Sitka; as well as Communications Station (COMMSTA) Kodiak, Alaska; and the International Ice Patrol in Groton, Connecticut.

The COTHEN network is an intricate and robust cellular grid of remote high frequency receiver transmitter sites located throughout the United States and the Caribbean. The sites are all linked together and controlled by the Customs Technical Service Center (TSC) in Orlando, Florida. Network operators monitor communications across the entire COTHEN network ensuring communications connectivity. In addition, the TSC operator has the ability relay message traffic and to provide high quality telephone patches between the aircraft and any valid telephone number. Between March and November 2003, the TSC successfully completed 391 aircraft phone patches in support of CG aviation operations.

Logistics/Support Issues Initial aircrew HF ALE operations and maintenance training was provided by ARSC personnel at each unit during the initial ALE installation. A fully functional ALE system has been installed in the HH-60 trainer at the Aviation Technical Training Center and ALE training has been embedded in the HH-60 avionics "C" school curriculum. An exportable fully functional ALE mock-up is also available at the request of any unit. Follow-on training will be determined as usage and needs dictate. The 309M-1 ALE processor and HF-9012D Remote Control come with a 1-year warranty. An extended warranty is not being considered, because of the equipment's high Mean Time Between Failures (16K-19.5K hrs for 309M-1 and 12.4K-29.2K hrs for HF-9012D) and low repair costs, these units will be shipped to the manufacturer for repair. Since ALE works the HF RT and coupler much harder than current operations, additional maintenance Operating Expense (OE) was added to the current maintenance funds for those systems

The ALE installations on CG HH-60 and HC-130 aircraft utilize the same ALE processor, remote control and system software. The HU-25C model installation uses a different legacy remote control, but is fully compatible with the ALE system aboard the HH-60 and HC-130. The current HU-25C remote control will remain installed pending future funding. All ALE systems will be compliant with military and federal ALE standards.

Although the ALE equipped aircraft now have immediate ALE communications with other ALE equipped aircraft, COTHEN and Scope Command; the primary purpose of this effort is to improve HF communications with CG shore stations and cutters. A parallel ALE installation effort at the Communications Area Master Station (CAMS), Communications Stations (COMMSTAs) and Groups is extremely important to the success of improving aviation long-range communications. Network parameters and operational doctrine will be developed collectively among CG HQ, Aircraft Repair and Supply Center (ARSC), CAMS and Telecommunication and Information Systems Command (TISCOM).

Additional information regarding HF ALE technology can be accessed in the Multi-Service Tactics, Techniques and Procedures for HF-ALE Radios at: http://www.e-publishing.af.mil/pubfiles/doctrine/tt/afttp(i)3-2.48/afttp(i)3-2.48.pdf.

Additional information regarding current CG aviation ALE efforts can be accessed on the ARSC web page at: http://cgweb.arsc.uscg.mil/eisd/content/avionics_support/hfale/hfale.cfm.

HH-60G Pave Hawk fresh out of paint.

HAS THE COAST GUARD GONE Camouflage?

If you have driven by the Aircraft Repair and Supply Center (ARSC) lately, you might have done a double take at the camouflaged HH-60 Helicopter being pulled out of the hanger. Has the Coast Guard abandoned their traditional orange and white for a new paint scheme of browns, greens and grays? What you're seeing is a joint effort between the U.S. Air Force (USAF) and the Coast Guard to perform periodic depot maintenance on the Air Force HH-60G Pave Hawk.

by Leon Chambers
ARSC, HH-60 JDLM Program Manager

How we got started. In the year 2000, the Air Force approached the Aircraft Repair and Supply Center about becoming an alternate government site for the Joint Depot Level Maintenance (JDLM) of their HH-60G Pave Hawk. The Air Force currently has a fleet of 105 HH-60G Pave Hawk helicopters, dispatched in a Low Density - High Demand model shares the Coast Guard's emphasis on readiness requirements. Needing an organic federal government facility to meet overhaul requirements, the Air Force saw ARSC's "one stop-shopping" product line business model as one that might demonstrate a significant comparative advantage as a provider of JDLM services.

Where we are. The first JDLM prototype was inducted into ARSC in September 2001, with a goal of 210 calendar-day Turn Around Time (TAT). Seven months later it emerged under cost, and 24 calendar-days ahead of schedule. The second aircraft was inducted nose-to-tail with a goal of 180 calendar-day TAT. Once again ARSC completed the aircraft ahead of schedule and under cost. ARSC used these aircraft to develop JDLM processes modeled after the Coast Guard's Programmed Depot Maintenance (PDM) Repair Workbook and a supply chain management system characterized by strong partnerships with USAF support commands and individual units. The JDLM crew, made up of dedicated team of contractors, has continued to achieve its lower TAT goals and has twice met its production target of 120 calendar days, delivering its last aircraft nine days early. The word is out within the Air Force; as units position themselves to be next to send their aircraft to the shores of the Pasquotank. The USAF and ARSC are currently working on an agreement for steady-state production.

Where we hope to go. In May 2003, ARSC finalized a business plan for the full production of JDLM aircraft. The business plan addresses the key issues involved in the depot maintenance of Air Force aircraft at ARSC:

1. Turn Around Time.
   a. 120 calendar-day target for steady-state production.
2. Growth Potential.
   a. Phase Maintenance.
   b. Additional HH-60 JDLM.
   c. TCTO Incorporation.
   d. Component Rework.

While the Aircraft Repair and Supply Center has already built an outstanding reputation inside the Coast Guard community, JDLM has raised its profile as a first class aircraft depot center. JDLM has also let ARSC prove its ability to cross service boundaries and has presented the opportunity, and privilege, of repairing aircraft that have seen Combat Search and Rescue action in the Middle East. For the USAF, the JDLM program is providing: the Right Stuff, at the Right Place, at the Right Time, at the Right Cost … EVERYTIME!

Frequency Domain Reflectometer (FDR)

New Avionics Test Equipment: Frequency Domain Reflectometer Antenna Analyzers

by CWO2 David L. Warfield
ARSC, Engineering & Industrial Support Division
Support Branch

Two new pieces of electronic test equipment will be in the Aviation Electrical Technician's (AET) flight line toolboxes this fall. The S331D Site Master Cable and Antenna Analyzer and the S820C Site Master Microwave Transmission Line and Antenna Analyzer. Both are manufactured by Anritsu and offer a new way of checking aircraft antenna systems; both cable and wave guide types.

The Site Masters are hand held Standing Wave Ratio/Return Loss (SWR/RL) and Distance-To-Fault (DTF) measurement instruments that include a built-in synthesized signal source. The Site Master is designed for measuring SWR, return or cable insertion loss and locating faulty RF components in antenna systems. The S331D covers the 25-4000 MHz range and the S820C covers the 3.3-20.0 GHz range. Both models include a keypad to enter data and a Liquid Crystal Display (LCD) to provide graphic indications of SWR or RL over the selected frequency range and selected distance. The graphic displays can be saved into the Site Master and later be connected to a PC and saved to a database. Once stored, the graphic trace can be displayed, scaled or enhanced with markers and limit lines. Historical graphs can be overlaid with current data to note changes or degradation of systems, which would indicate which components need replacing or upgraded. The cost to procure the two FDRs and associated connector accessories were approximately $25K per set. ARSC will provide the units with the initial provisioning and recurring test equipment support.

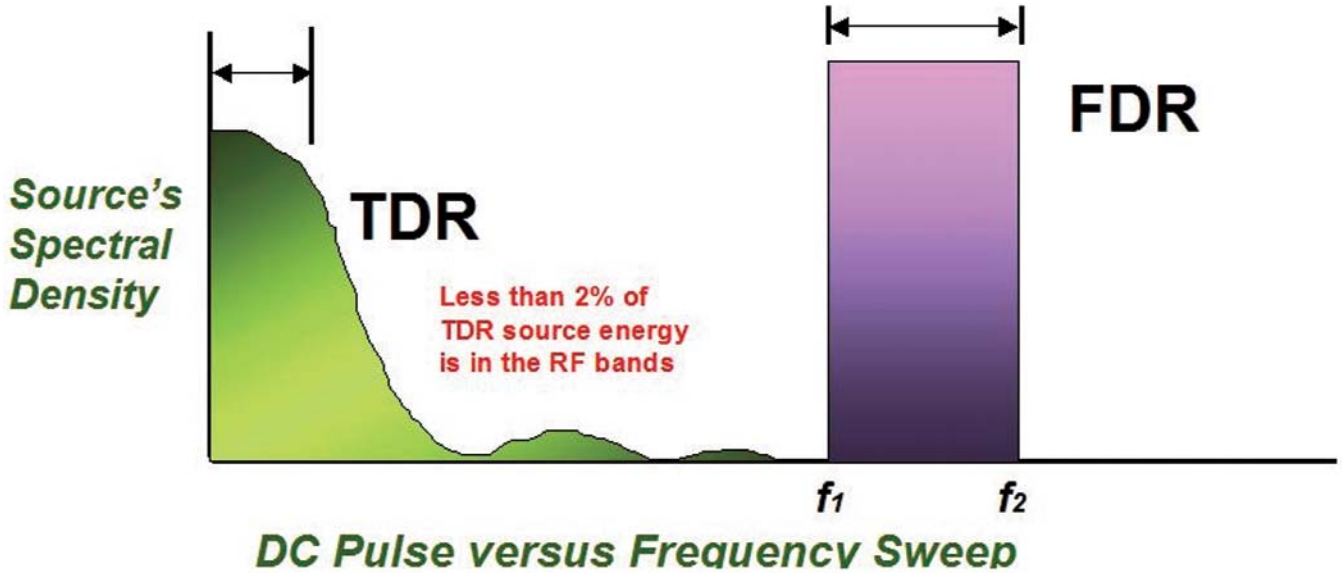
The FDR will reduce aircraft maintenance man-hours, equipment damage and repeat discrepancies. Aircraft Repair and Supply Center/Engineering and Industrial Support Division (ARSC/EISD) will be modifying aircraft Maintenance Procedure Cards (MPCs) to include using the new test equipment for both scheduled and unscheduled cards. Units can expect to start receiving the new Site Masters this fall, after the MPCs have been finalized and a training plan is in place.

The Site Masters are Frequency Domain Reflectometers (FDR) and will provide the field with a standardized, repeatable method of testing RF coaxes and waveguides and is usable on all aircraft. The present use of the current Time Domain Reflectometer (TDR), which operates at 150Khz, is of limited use on systems that operate above 30Mhz. A FDR will test an RF system at the frequency of operation, providing readings that a technician can use to accurately determine the quality of the RF system, make necessary repairs, then Quality Assurance (QA) the repair. Troubleshooting RF systems is part science and part art. The technician uses as his primary tool an SWR meter, but what does he have when that system is not a transmitter or he's working on a waveguide?

TDR: A Time Domain Reflectometer is very useful for finding faults in coax lines as well as twisted pairs of wiring. The TDR shoots a DC pulse down the cable and listens to returned energy. This returned energy represents faults in the line, and by using timing, determines the distance to the fault. The usability of the TDR diminishes as the system frequency of operation is increased. The ability of the TDR to see faults at the VHF range is diminished and provides minimal value when troubleshooting antennas. Moreover, DC pulses from a TDR cannot "see" beyond band limiting devices such as filters or duplexers, which are common in today's Coast Guard aircraft antenna systems.

Site Master S820C.

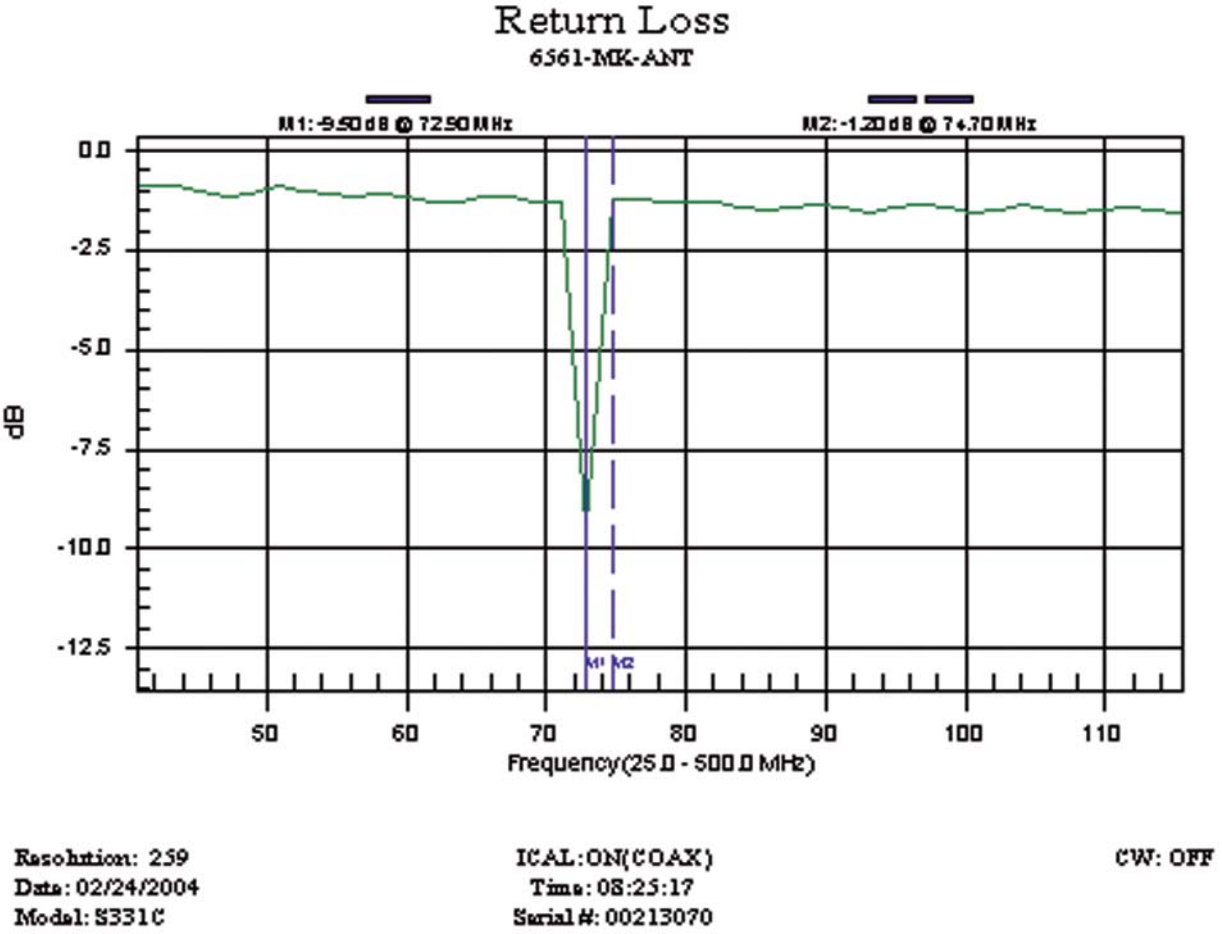
Site Master S331D.



DC Pulse versus Frequency Sweep

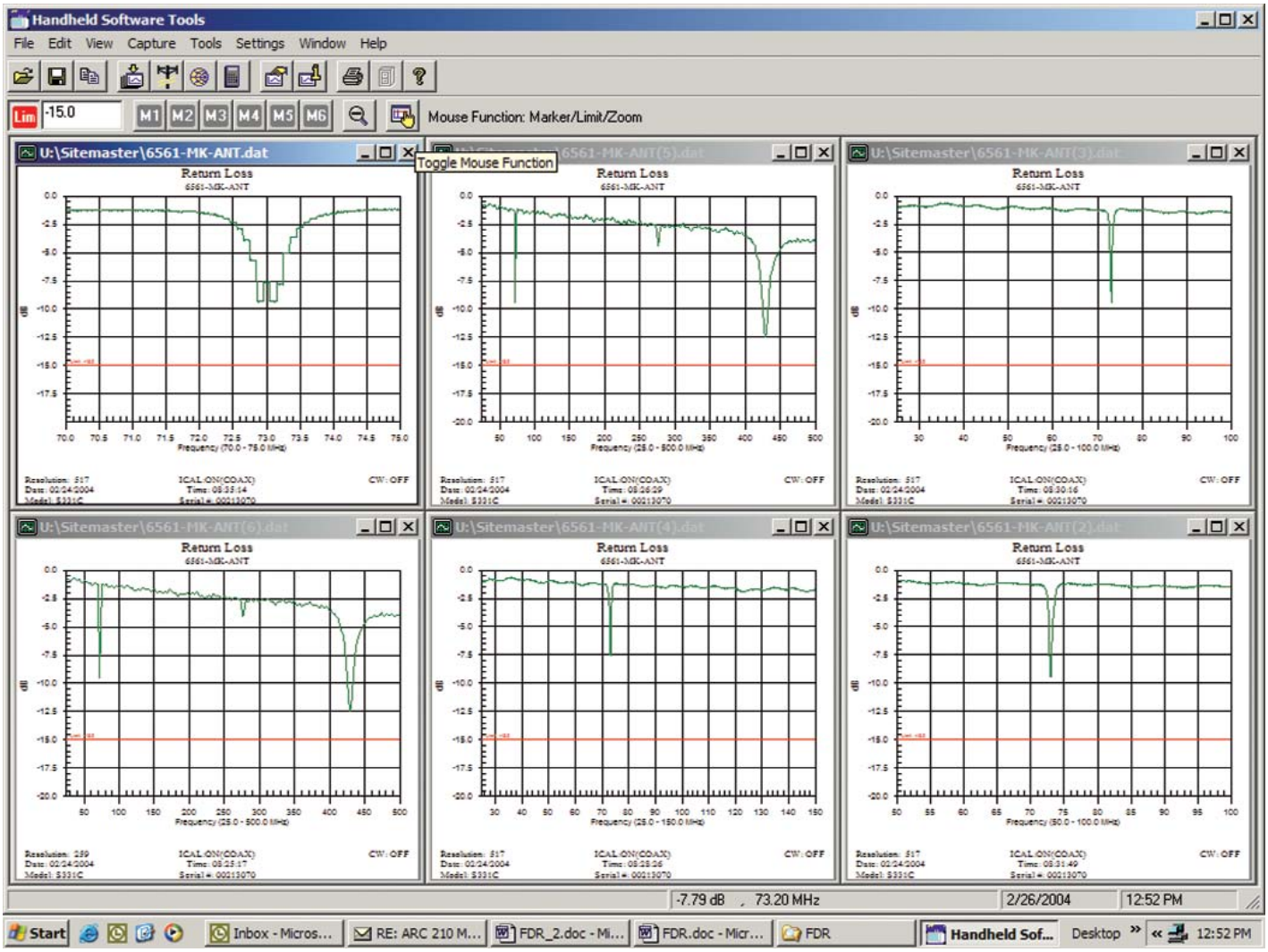
FDR: A Frequency Domain Reflectometer (FDR) operates by sending a swept RF signal at the frequency range chosen by the operator. Since FDR technique uses an RF sweep, antennas are tested at their nominal operating frequency. This same RF sweep signal can pass through the various band limiting devices such as filters or duplexers, which are common to many of our aircraft antenna systems, thereby providing an accurate measurement of the transmission line's characteristics. Faults are seen as an increase in insertion loss and/or return loss. Insertion loss is the actual loss imposed by the cable, return loss is the amount of energy that is reflected back to the signal generator (FDR) by imperfections and is related to Standing Wave Ratio (SWR). Between the insertion and return lost tests, damage or imperfections in the cable and/or the connector is readily seen. Distance to Fault (DTF) is calculated in the FDR and is displayed graphically. Additionally, a FDR will show the frequency response of an antenna, allowing for the rapid determination of its serviceability. Too often an antenna is replaced because the technician has exhausted all troubleshooting possibilities. With the FDR, the technician will have data available to decide whether the antenna needs to be replaced.

The utility of the FDR is best illustrated by the recent failures experienced by both the Coast Guard (CG) Falcon Jet (HU-25C) and the CG Hercules (HC-130) radar systems. Both of these aircraft have waveguides that are used to route high power RF from the transmitter to the antenna. Imperfections or contamination in the waveguides caused an increase to the return loss (SWR), and over time, faults developed. The faults continued to increase in magnitude internally in the waveguides until they started causing damage to the transmitters. The damage to the HU-25C radar was the destruction of $20K transmitter tubes from internal arcing in the waveguide. It was not until the Falcon Sensor Upgrade Project was started that the degradation of the radar system was noted, and the decision was made to replace ALL waveguides. The HC-130 has followed a similar path, the decision to replace all of their waveguides being made just recently. In both cases, there was no test equipment available to objectively evaluate the waveguides. The use of a FDR would have prevented the loss of several $100s of thousands of dollars in damaged equipment, not to mention missions cancelled. On a smaller scale, a lesser capable FDR has been used to analyze MILSATCOM [Military Satellite Communications] antennas that had been removed from an aircraft and turned in to ARSC as non-serviceable. All the antennas tested proved to have no discrepancy, and were returned to supply, a cost avoidance of over $60K.



Graph showing an installed Marker Beacon antenna that is off frequency, Center frequency is measured at 72.9Mhhz, required is 75Mhz.

Aircraft RF systems not presently capable of being properly tested by any equipment at an air station include: VOR, Marker Beacon, Localizer, Glideslope, DME, TACAN, IFF, Radar Altimeter and Radar. For the most part, air stations do have the equipment to troubleshoot the voice communication radios, these systems being: VHF-FM, VHF-AM and UHF. Note that the HF radio is not mentioned as it uses an antenna tuner that tunes a long wire antenna to the proper frequency, and thus is not a suitable system for testing with a FDR.



Screen shot of the Anritsu software screen while evaluating the Marker Beacon antenna problem.

Another use for the FDR is to record long-term degradation of an RF system. Like a TDR, the FDR is capable of recording the measurements made. However, the FDR allows for the test to be recorded in electronic format. Anritsu's software program allows for the direct comparison of measurements by overlapping the two (or more) traces, allowing you to compare, measure and calculate actual losses over time. A goal of all aircraft maintainors is reliable prediction of when maintenance is needed before a system fault incurs non-scheduled maintenance. By using the record function of the FDR, this goal could be a reality.

In closing, the FDR will add a powerful tool to our technician's toolboxes. The ability to monitor transmission line's health and pin point degradation of cable, wave guides and components will allow repair and replacement before the failure -- not after.

Starch Media Blasting System Comes to ARSC

by Joe Ferguson
TAMSCO

An innovative and environmentally friendly idea in paint removal is taking shape at the Aircraft Repair and Supply Center (ARSC) in Elizabeth City, North Carolina. Under the direction of the ARSC Engineering Officer, a working group, consisting of members representing each of the individual aircraft product lines as well as Industrial Systems, the Aging Aircraft Branch, the Safety and Occupational Health Division and Component Repair Cell have developed an engineering specification to incorporate a new cornstarch blast media paint removal process for stripping the aircraft and subcomponents that flow through ARSC for their overhaul cycle. Replacing the current plastic media paint removal system, this starch media blasting process will provide benefits, both from an environmental and industrial standpoint and allow more flexibility in the removal of a wider variety of paints/coatings.

Introduced to the aerospace industry in the early 1990's, Starch Media Blasting is emerging as one of the premier paint removal technologies available to replace chemical and plastic bead paint stripping systems. Manufactured by ADM/Ogilvie under the trade name Envirostrip, this product is being used by both military and commercial groups to strip a wide variety of aerospace coatings from airframe and airframe components. Described as the dry stripping media of the future because of its gentle nature on aluminum alloys and composite materials, the starch media has won critical acclaim in both civilian and military test programs.

Starch Blast Media, as the name implies, is engineered from corn and wheat starch that comprise the heart of the system. Upon initial review by ARSC personnel, the wheat starch was scrutinized and rejected due to the fact high humidity affected its performance greatly. Further review of the alternative media revealed that humidity did not affect the performance of the cornstarch blast media (ENVIROStrip®XL) and it would fit perfectly with the stripping system. The new media is non-toxic, biodegradable and an engineered polymer media derived from corn, an inexpensive renewable source. A patented multi-step process takes cornstarch, a fine powder, and transforms it into crystalline-like abrasive particles that resemble plastic abrasive media. Starch Blast Media can be used in the same dry stripping systems after cleaning/purging and some minor modifications to the existing equipment. While conventional dry stripping has proven effective in a production facility like ARSC, the aggressive nature that dry stripping (i.e., glass beads, plastic, etc.) has on aluminum and composite structures led the ARSC engineering staff to look for a better way to accomplish the stripping process. The availability of this blast media process fits with the engineering concerns related to the surface alteration and/or damage often related to the use of plastic abrasive. Testing data has already been developed by commercial and military entities so much of the "leg work" to incorporate the new system is already in place. Testing has shown that the starch media removes a wide variety of coatings, from common polyurethane/epoxy paint systems to more

sophisticated systems such as rain erosion resistant coatings and radar absorbing materials. Also tested was the removal of vinyl from aircraft interior panels, the removal of sealants from components and/or fuel cells, and also paint removal from cadmium-plated parts where the plating was left intact. This selective layer stripping without substrate damage was unlike anything ARSC had seen before and an example of the potential benefits to be derived from this system.

The whole process began two years ago when the HH-65 Product Line Tech Services became aware of a problem with the stripping process of HH-65 floorboards. These floorboards were taking a severe beating and being damaged from the overhaul process -- a better way to recondition them was badly needed. A procedure to strip the floorboards was needed that 1) would not damage the product and 2) would be friendly to both the environment and the people using it. AMTC Dan Lupton researched and discovered technical literature on the manufacturer, ADM/Ogileve, and the innovative process that they had developed. Consulting with the company as to the requirements for conducting testing on our aircraft/aircraft parts led to an on-site visit by both the company that manufactures the media, ADM/Ogilvie, and the U.S. distributor, Midvale Environmental Technologies. After examining ARSC's facilities, and making some minor modifications to an in-house blasting cabinet, the plastic bead media system was converted to the new cornstarch blast media system and readied for testing. In March of 2003, the stripping process on the first floorboards began. Preliminary results revealed a quick turnaround time for the floorboards (four days versus ten), no damage to the base material when removing the coatings present, and the system performed according to specifications, exactly.

EnviroStrip®XL has many advantages that was helpful to the introduction of this process here at ARSC:

- Equipment Compatibility: Can be used in existing equipment without limitation.
- Moisture Resistant: Withstands condensation and upon drying will return to a granular state.
- Long Product Life: Low breakdown rates reduce product consumption.
- UV Fluorescent: The blast media is detectable under black light making for easy detection during post-strip inspection.
- Materials Compatibility: Removes virtually every coating from common epoxy and polyurethane paints to low observable coatings.
- Effective on Most Metallic Surfaces: Safe for aluminum alloys, with no significant mechanical effects and it leaves an acceptable finish on soft clad aluminum.
- Effective on Composite Materials: Corn hybrid polymer can be applied to carbon fiber, fiberglass and aramid (Kevlar®) with no significant effect to surfaces. Safely and efficiently strips most composite structures and parts from fiberglass radomes to graphite stabilizers.
- Process Control: In many cases coatings and paints can be removed selectively leaving the primer intact. The forgiving nature of the stripping process minimizes risk to the material being stripped.
- Improved Environmental and Worker Safety: The blast media is a non-toxic, biodegradable material that eliminates hazardous chemicals from the work environment. Additionally, it is the cleanest, most environmentally responsible depainting media available, and it is a 100 percent renewable resource.

Midvale Environmental Technologies, the product distributor, has an abrasive recycling program where the used blast media is returned for recycling. Returned abrasive residues will be used as a product called StarZorb. StarZorb is an absorbent that will be used to collect hazardous waste at a licensed TSDF (hazardous waste processing facility). After the StarZorb is used, the TDSF will properly dispose of the used absorbent material. The company as a result is providing us with a "closed loop" system. They will provide us the material and then remove and dispose of the residue, vastly reducing the headache of waste disposal. Additionally, the company is responsible for all record keeping on materials covered under the recycling program.

A lot of hard work by ARSC's HH-65 Tech Services, Aging Aircraft Branch, Engineering and Industrial Support Division, Component Repair Cell, the Safety and Occupational Health Division and all four aircraft Product Lines has provided ARSC with an opportunity to improve in three different areas: Using a product that affords greater paint stripping flexibility; limiting the exposure of personnel to hazardous materials; and being a good steward with regards to the environment. The benefits that ARSC is currently experiencing are worthy of consideration by any industrial organization and its personnel that have similar requirements.

ARSC implemented and commenced use of the cornstarch blast media system for all four airframes in March of 2004. The learning curve for this innovative paint process was minimized through extensive upfront training for all paint stripping personnel and the development of clear engineering specifications/maintenance procedures. Although the long-term benefits will not be fully realized for years to come, the initial evaluations/reviews have been very positive as to the quality of product coming out of this stripping process, and the switchover to this system has had no negative impact on the process flow-through days for the aircraft and sub-components.

From Opponent To Proponent

by LCDR Keith Overstreet
ARSC, ISD

Coast Guard Information Technology (IT) utility appears to be mirroring society, as it is rapidly moving from a support role to an operational necessity. The increased reliability on IT leads to a heightened need for increased personnel specialization and internal process improvements. IT expertise is required to develop, maintain and use the resources. Industry within the United States has been able to progressively squeeze more productivity out of available resources by becoming more specialized. The Census Bureau states that output per hour of work increased 103 percent between 1980 and 2003 in the United States[1]. At the same time, the National Center for Education Statistics indicates that the number of master's degrees awarded per year increased 104 percent between 1970 and 2000[2] -- if you doubt this statistic, just take an informal poll the next time you are in a major metropolitan area with a group of white-collar workers. Loss of flexibility is a potential result of increasing productivity through specialization. This is the point where careful planning must take place in order to ensure that processes are in place to guard against losing the ability to adapt to changing situations. It may even require organizations to rethink personnel development and placement.

At this point you must be wondering where this viewpoint is coming from. Over the last twenty months, I have had the privilege to have moved from an operational unit managing aircraft maintenance; completed a graduate school program focusing on business processes; and placed in charge of a shop of very talented computer programmers who write and maintain cutting-edge aviation support applications. At the operational level I was a typical low-tech computer user who was hesitant to adopt, or interested in taking the time to learn how to use, another computer application. It appeared to me that the workload for supervisors, and frequently line mechanics too, increased with every new IT tool that was implemented. I now realize that there is not always a direct correlation between a field user's workload and the introduction of an additional application, which is more likely than not preceded by a mandate to change a business practice.

Let's spend a little time on the concept of risk vs. gain of specialization. At what point do we become so specialized that our productivity actually decreases? How do you truly quantify a member's level of specialization? This slippery slope can also lead us down the path of questioning what limits should be placed on outsourcing. I will leave this politically charged "hot potato" for another author. The intent of the questioning above is to propose that as we move into the realm of greater productivity through specialization, organizational planning must compensate.

Leaders throughout the Coast Guard must be aware that establishing appropriate processes is one form of planning that can provide a safety net for the pitfalls of over-specializing. A good start is to follow the International Organization for Standardization (ISO) standards, which support process documentation that promotes customer satisfaction. Documentation of the processes should be located in a common area that is updated and available to all who need it.

I was surprised, and a bit concerned, last year when I was informed that I was being put in charge of a software development shop at the Aircraft Repair and Supply Center (ARSC). My first thought was that the detailing people must have me confused with someone who had an IT background. My second thought was that the Coast Guard was about to discover something about the risky part of specialization. The first observation I made in the new job was that there was no way for me to "fill the shoes" of my successor from a technical perspective. I did realize at the time that I could provide the operational perspective necessary for the creation of user-productive software for the field. Maybe the detailing folks weren't off their rockers after all. The second observation I made was that the division chief had established processes for configuration control, testing and quality control that keep the technical aspects of the job in the hands of the true technicians. The design of the processes inherently provided for appropriate checks and balances that allowed managers to focus on planning, while leaving the technical aspects of the job to members who

had a high level of training in key competencies. These specialists were either government employees or contractors hired to do work requiring specific skill sets. The processes put in place supported shorter ramp-up times and typical rotation intervals for movement of active duty Coasties through the department. Adhering to this structured process facilitated personnel turnover, decreased everyday "fires," and aligned members' efforts within the organization.

This doesn't sound like a novel idea at all, does it? The interesting point is that the implementation of these processes began only three years ago, and has since shown positive results. The workload naturally increased as the functionality of the applications grew, but service either improved or remained constant in all areas measured. How should the results be quantified? This is the point where you must remember the customers. Your gauge for determining success should be from your customer's point of view. Our department limited the number of metrics to ten in order to keep perspective. System availability, response time and duration, satisfaction, rework and cost are examples of statistics that are captured for trend analysis. These metrics are kept up to date and made visible to all members of the department.

Now let's move from a headquarters perspective to that of an operational unit. How far down should you push the need for increased specialization? How much IT expertise is expected from the field? How can Coast Guard leadership expect operational units to enthusiastically welcome another mandated computer application that seemingly adds no utility to the field, but comes with increased vulnerabilities? The Electronic Aircraft Logbook (EAL) is a good example of an application that is being fully deployed to all air stations. The line mechanic could not care less that an administrative person stationed at a headquarters unit has more data readily available for mining as a result of the deployment of EAL. That mechanic probably does not even see the need for improved discrepancy trend tracking or improved asset management. The line mechanic would like to be able to continue to work on aircraft and not be burdened by learning another computer application.

We at ARSC believe that a successful deployment of an application is closely tied to support provided, especially in the early stages. The final phase of a Coast Guard-wide deployment of EAL is now in full swing. A team of trainers will go to individual units as that unit begins to make use of the full functionality of the EAL application. They will show that line mechanic, one-on-one, how EAL will help him/her "work smarter." These trainers will stay at the units throughout the introductory period (5-9 days) to assist with group and individual instruction. Additionally, a 24 x 7 Help Desk watch has been established to assist with user concerns.

We also believe that EAL should be maintained in a fashion that creates as little disturbance as possible. In other words, make the computer application mirror the legacy paperwork as closely as possible. For example, the flight generated discrepancy pages are pink, just like the "pink sheets" that were used previously. The "blue" and "yellow" sheets are also the same color as the paper-based process. This theme has been engineered throughout the application. Another pillar has been the belief that the best feedback comes from the field. Suggestions from the field are being implemented with every release. This provides ownership for the users, and makes it clear that we are responsive to their needs. The fact that the application was developed and is maintained at ARSC is an important piece of the success story for EAL. Every EAL user has the power to make suggestions that could potentially alter the application and make it more functional for the end user.

So here I sit as a former IT opponent, singing the praises of mandating the use of an additional computer application at operational units. It's hard for me to say otherwise when I hear stories like the one about a helicopter crew that executed a precautionary landing at a non-aviation station, documented maintenance, and received authorization for flight online, without depending on timing with key personnel, location or a telephone. What is more impressive is that every member with access to the application could see the process unfold in real time -- while seated at their own desks. I also hear about tools that have been developed that allow Aviation Engineering personnel to better communicate with operations personnel. Now that is a step in the right direction. Introducing new applications creates change for Coast Guard members, and no significant change is ever implemented without a certain amount of frustration, followed by learning, followed by adjustment. Our job is to make that process as seamless as possible, continue to listen to the voice of the customer, and make adjustments to benefit the end-user.

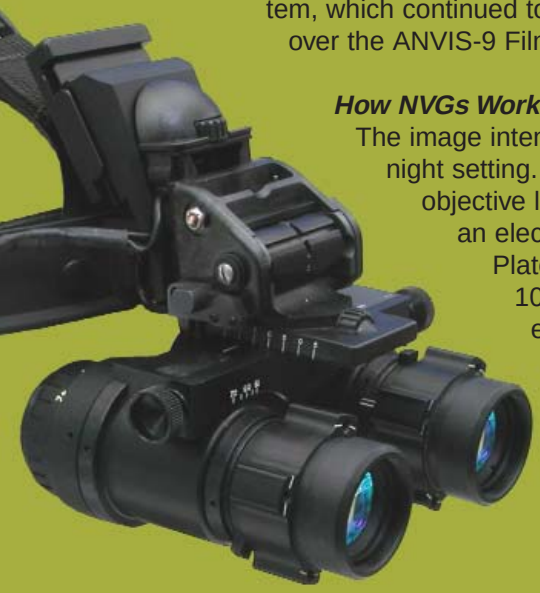
The level of specialization required within the Coast Guard must be continually evaluated, and processes must be put in place that compensate for lapses in specialized skills. At some point there may be a need to create an IT career track for pilots, similar to the current Aviation Engineering or Operations career paths. It hinges on how comfortable Coast Guard leadership is with relying on contracts and outsourcing to fill its needs. Once again, the same issues facing the Coast Guard are facing industry leaders throughout this great country.

[1] http://www.census.gov/prod/www/statistical-abstract-03.html
[2] http://nces.ed.gov/programs/digest/d02/index.asp

USCG Aviation Night Vision Goggle Program

by CWO Randy Jenkins
ARSC, Aviation NVG Program Manager

United States Coast Guard Aircraft Repair and Supply Center's (ARSC) Night Vision Goggle (NVG) program has recently recapitalized the aviation NVG inventory. The AN/AVS-6 (ANVIS) was replaced by the AN/AVS-9 Pinnacle system. ANVIS-6s were first procured for Coast Guard aviation in 1991. Night Vision capabilities for aircrew removed the veil of darkness and allowed aviators to perform their missions safer and more successfully. Recapitalization began in 2001 with the first procurement of ANVIS-9 Generation III (Gen III) systems. The Gen III tube used in the ANVIS-9 had improved Visual Acuity over the older GEN III tube used in the ANVIS-6; other improvements to the ANVIS-9, primarily in the objective lens, allowed for easier operation of the goggle. In 2002 the second procurement phase introduced the ANVIS-9 Filmless system, which reduced the glowing halo around light sources. The final procurement phase introduced the ANVIS-9 Pinnacle system, which continued to provide reduced halos but also improved Mean Time Between Failure (MTBF) over the ANVIS-9 Filmless.



How NVGs Work All darkness encountered in the night environment contains some amount of light. The image intensifier tube (I2) amplifies this small quantity of light to allow the user to see in the night setting. As illustrated in Figure 1, Photons (light) from the observed image enter in the objective lens. The input (photons) enters a photo-cathode that converts the light image to an electron representation of the image; thereby providing electrons to the Microchannel Plate (MCP). The MCP is a thin, glass, honeycomb-like structure with approximately 10M microscopic hollow tubules (microchannels), all parallel to one another but canted at roughly eight degrees. The MCP (glass) is made conductive by coating it with a metal solution. The electrons exiting the photo-cathode enter the microchannels, but cannot go through without hitting the wall because of the eight-degree cant. In doing so, the striking electron removes other electrons with it off the wall; this process continues until the electrons pass through the MCP. This bouncing back and forth along the walls results in a multiplication of electrons. Therefore, the MCP acts as an electron multiplier, with each microchannel providing one specific portion of the viewed image. The original image in the objective lens is now amplified by the MCP and converted from electrons to photons by the Phosphor Screen.

Differences Between ANVIS-9 Systems Differences in the GEN III, Filmless and Pinnacle systems are due to the type of image intensifier tube used in the ANVIS-9 goggle. The standard filmed GEN III tube used in the first ANVIS-9 had improved visual acuity over the older GEN III tube used in the ANVIS-6, but it failed to reduce the glowing halo around light sources as illustrated in Figure 2 (see next page).

Compared to Figure 2, Figure 3 (see next page) illustrates how the Filmless and Pinnacle tubes greatly minimize the glowing halo around light sources. The glowing halo is produced by some of the electrons exiting the photo-cathode striking the face of the MCP and do not immediately enter the microchannels. These electrons bounce back toward the photo-cathode in an arcing motion, falling back to the MCP, and eventually enter the microchannels. This "bouncing" of electrons provides the halo effect commonly seen around light sources. The size of the halo is directly related to the distance between the photo-cathode and the MCP. As electrons strike the microchannel walls they release not only additional electrons, but also ions that are left over impurities from the microchannel manufacturing processes. The ions migrate from the MCP back toward the photo-cathode. Over a period of time (thousands of hours), the photo-cathode can be damaged from the ions. In the GEN III tube, coating the MCP with an ion barrier film minimized damage. Although this film protected the MCP, it was a factor in limiting the overall performance capability of the tube. The Filmless tubes were manufactured without the ion barrier film, hence the name filmless. Although the Filmless tubes provided increased initial performance over the standard-filmed GEN III tubes, testing showed that long-term tube performance without the ion barrier film decreased at a rate higher than that of the filmed tubes. In order to satisfy the requirement for increased and sustained performance over 10,000 hours, the manufacturer reduced the thickness of the ion barrier film. This resulted in the Pinnacle tube, which provided protection to the photo-cathode, gained the benefit of higher sustained performance and also minimized the halo effect.

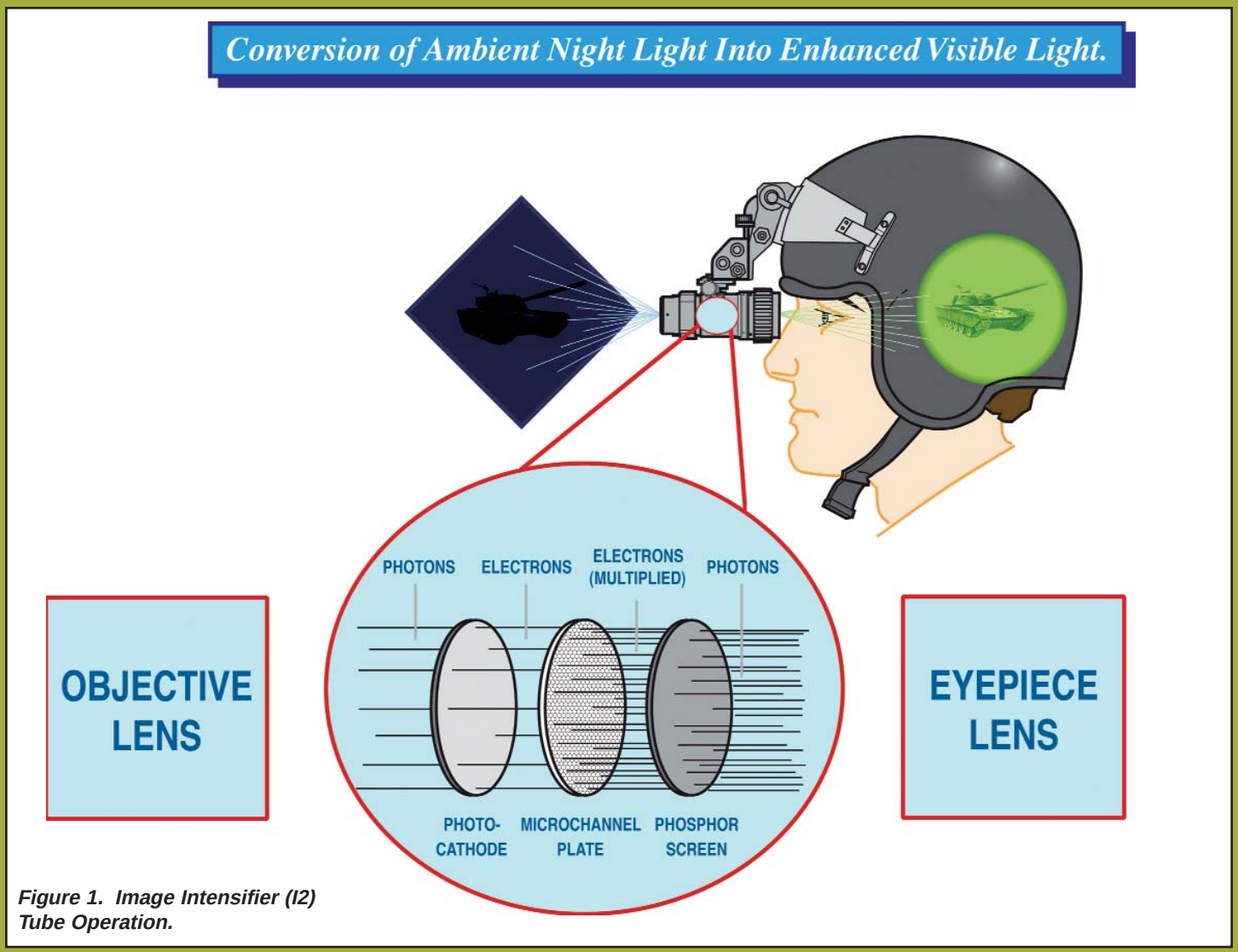


Figure 1. Image Intensifier (I2) Tube Operation.

Figure 2. Light halo around light source.

Figure 3. Reduced light halo around light sources.

One last difference in the ANVIS-9 systems is the type of power supply used in the tubes. The Pinnacle and Filmless tubes incorporate auto gating, or pulsing power supplies, which provide improved visual acuity during operations in regions of bright lights. The tube voltage is rapidly pulsed on and off to prevent saturation of the MCP under high light levels. The power supply automatically varies the pulse width (duty cycle) depending upon how much current is passing through the MCP. At low light levels, the duty cycle approaches 100%, while at higher light levels it is shortened, almost shutting down for a few microseconds to allow the flux of electrons to exit the MCP before applying power once again.

Wearing the ANVIS-9 The ANVIS-9 is authorized for use in both Rotary Wing (RW) and Fixed Wing (FW) aircraft. All RW crewmembers are authorized to wear the ANVIS-9 on the SPH-5CG or HGU-56P helmet as shown in Figure 4. Only C-130 scanners and HU-25 observers are authorized to wear the ANVIS-9 in FW aircraft. FW crewmembers can wear the ANVIS-9 on the SPH-5CG or HGU-56P helmet, or the 274974-1 Mask Head Harness Assembly as shown in Figure 5.

Summary Currently, USCG aviation has 605 ANVIS-9 Pinnacle systems and 59 ANVIS-9 Filmless systems. All ANVIS-6 and ANVIS-9 GEN III systems have been removed from aviation inventory. The ANVIS-6 and ANVIS-9 GEN III systems are currently being transferred to Office of Command, Control and Architecture (G-OCC) and Office of Cutter Forces (G-OCU) for use on U.S. Coast Guard Cutters. These systems are first shipped directly to the Naval Surface Warfare Center (NSWC) Crane, Indiana, where they are screened, modified and fitted for use in the surface fleet.

The ANVIS-6s and ANVIS-9s have allowed Coast Guard aircrews to find people in distress, illegal aliens and smugglers at sea that otherwise would have gone undetected. The ANVIS-9 is a good example of money well spent for a sensor system that has allowed USCG aviators to perform their job and do it well.

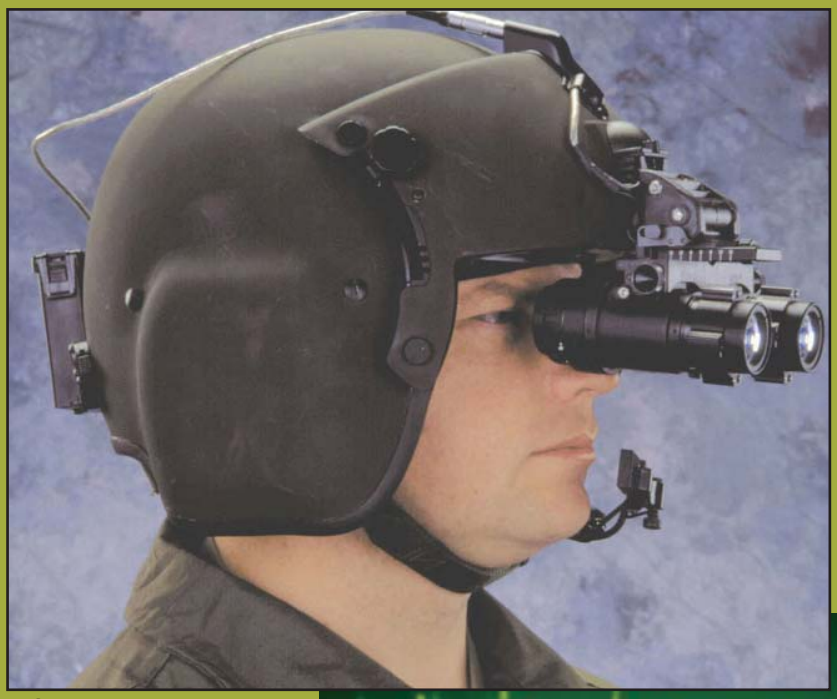


Figure 4. ANVIS-9 mounted on HGU-56P.

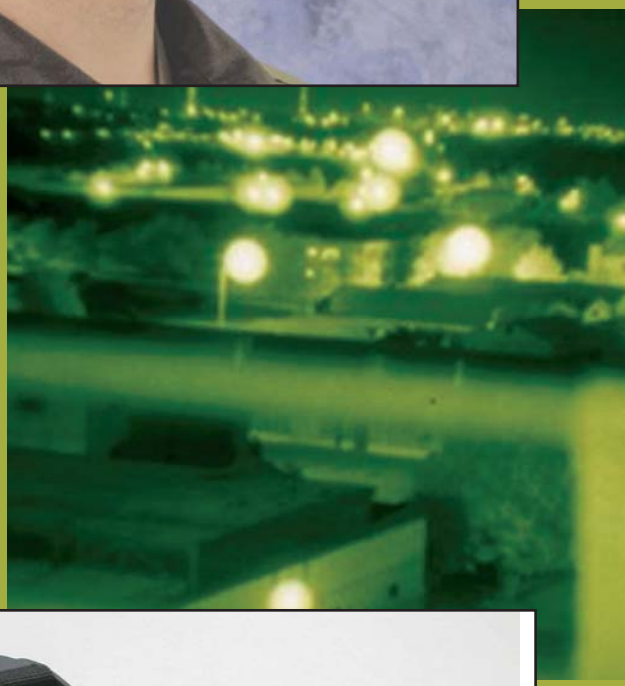


Figure 5. 274974-1 Mask Head Harness Assembly for fixed wing crewmembers.

Leaps and Bounds in Marine Disaster Heavy Viscous Oil Recovery Engineering Technology

by LCDR Peter C. Nourse, PE
Response Systems Team
Ocean Engineering Division
Office of Civil Engineering

Image courtesy of SMIT and Frank Mohn A.S.

Background

Consumption and transportation of heavy viscous oil products are on the rise globally. By 2020, the number of freight vessels carrying crude oil will double in size according to the U.S. Coast Guard (USCG). Additionally, there are other emerging threats to the environment regarding the use and transportation of heavy viscous oils. The Institute for the Analysis of Global Security indicates that future terrorist activities will likely target symbols of economic dominance such as refineries, pipelines and gas facilities. Additionally, it cites that there are increasing signs of collusion between terror and maritime piracy. New International Maritime Standards for port security in response to potential maritime threats combined with increased maritime use of heavy oils drives the requirement to advance heavy oil recovery technology.

Marine environmental disasters such as M/V KUROSHIMA (Alaska, 1997), T/B MORRIS J. BERMAN (Puerto Rico, 1994), M/V NEW CARISSA (Oregon, 1999), T/V ERIKA (France, 2001), T/V BALTIC CARRIER (Denmark, 2002), USS JACOB LUCKENBACK (California, 2002), and T/V PRESTIGE (Spain, France, 2002) have demonstrated the limitations of traditional lightering methods used by responders, including the U.S. Coast Guard, and that innovative techniques are required to offload extremely viscous product prior to its contamination of the environment.

The Joint Viscous Oil Pumping System (JVOPS) Workshop, conducted in Houma, Louisiana, USA, from 01 - 15 December 2003, and hosted jointly by the U.S. and Canadian Coast Guards, was the first ever international exercise to improve the first-response systems of the U.S. and Canadian Coast Guards, the U.S. Navy Supervisor of Salvage and the international response industry in the area of heavy viscous oil at-sea recovery. The event entailed a thorough evaluation of the heavy oil off-loading systems of several countries in a simulated response scenario of extreme viscosity and pumping distance. The Workshop was planned and executed by the JVOPS Workgroup, a multi-national group of engineers, scientists, pollution response, equipment manufacturers and first responders dedicated to improving heavy viscous oil response worldwide.

Previous USCG work in this area resulted in the development of the Viscous Oil Pumping System (VOPS), a heavy viscous oil product flow enhancement addition to the standard lightering equipment of the USCG National Strike Force (NSF). The system employs water lubrication technology applied to traditional positive-displacement pump systems. The concept is to inject water into the discharge side of standard NSF lightering pumps. The water creates a "sleeve" around the heavy viscous oil inside the pump discharge hose in effect "tricking" the pump into thinking that it is pumping water and not

Figures 1a - 1d. Tested Pump Systems. Arrows denote attached or integral water lubrication devices.

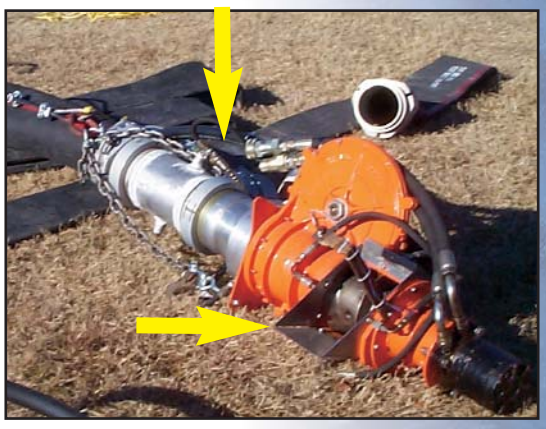


Figure 1a. GT-185.

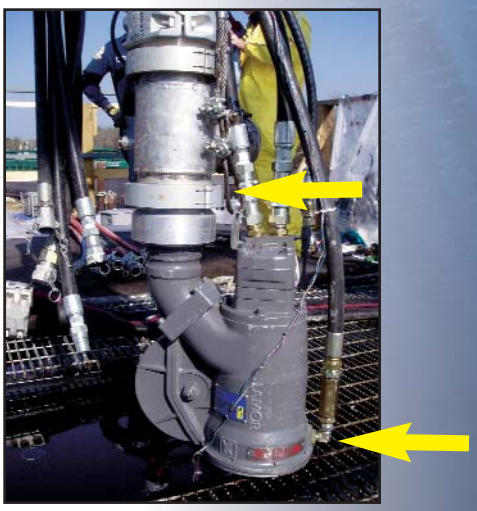


Figure 1b. Lamor GT A-50.

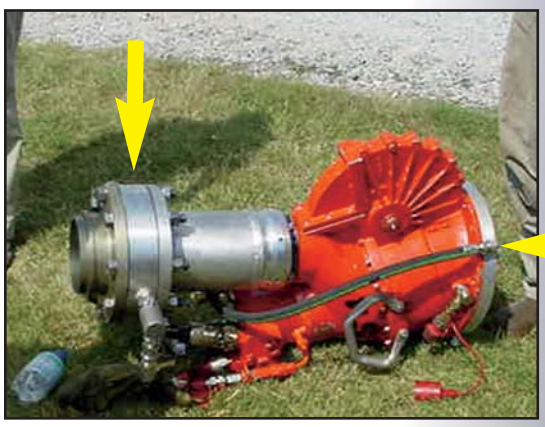


Figure 1c. Desmi DOP-250.

Figure 1d. Framo TK-125.

a thick, viscous product. This allows pump flow rate and pumping distance to be increased by orders of magnitude. For background in the technical development of this system, see *Systems Times* Summer 2000 issue.

Work on the improvement of heavy viscous oil marine recovery technology both in the USCG and Canadian Coast Guard (CCG) prior to the JVOPS Workshop, proceeded on parallel courses for several years without technological cross-connect. While the USCG tests pumped product through hoses up to 450 meters long, the oil used had only a viscosity of up to 27,000 cSt. -- far less than real-world response conditions. The CCG had pumped bitumen with viscosity of more than 2,000,000 cSt., but had not attempted to transfer it further than 11 meters. Disasters such as the NEW CARISSA underscore the need for response technology to succeed under combined conditions of extreme viscosity and pumping distance.

In early 2002, Canadian and U.S. Coast Guard engineers formed the Joint Viscous Oil Pumping System (JVOPS) Workgroup. The highlight of the partnership was to be the JVOPS Workshop. The chief goal of the Workshop would be to determine the operational envelopes of the response lightering systems of international inventories when subjected to concurrent extreme viscosities and pumping distances, and in so doing, determine how to improve them. The event was advertised internationally. Any and all response agencies or companies were free to participate. Project funding was ensured by establishing a voluntary matrix of project component sponsorship costs, allocated amongst the participants.

JVOPS Workshop Goals

JVOPS Workshop primary goals were:

a. Determine the maximum operational pumping distance for U.S. Coast Guard pump systems when pumping product of at least 200,000 cSt. viscosity oil using up to 450 meters of 150 mm (6") hose.
b. Determine the maximum operational pumping distance for Canadian Coast Guard pump systems when pumping product of at least 500,000 cSt. viscosity oil using up to 150 meters of 150 mm (6") hose.
c. Determine the optimal water lubrication combinations and percentages for subject pump systems.
d. Determine the operational capabilities of participating manufacturers' pump systems and flow enhancing equipment.
e. Investigate local bulk steam heating at the inlet of subject pumps.
f. Test a revised-design Annular Water Injection Flange (AWIF); (Discharge Side Annulus Ring Water Injection).
g. Investigate the reestablishment of water lubrication following pump system shutdown.
h. Verify hydraulic pressures and flows vs. pump capacities to determine pump horsepower efficiency envelopes for pump systems.

The viscosity of goal "a" was to simulate a heavy bunker or No. 6 fuel oil when subjected to cold ambient temperatures of seawater during maritime disaster. The viscosity of goal "b" was to simulate the extreme viscosity of bitumen.

Two pump systems from the U.S. and Canadian Coast Guard's response inventory, and pumps from Lamor (Finland) and Framo (Norway) were tested. The Desmi DOP-250 pump is the standard lightering pump of the U.S. Coast Guard. The GT-185 pump is the standard lightering pump of the Canadian Coast Guard. See Figure 1 for photos of tested pumps with their associate water lubrication injection devices.

The JVOPS Workshop was conducted at the Cenac Towing, Inc., facility in Houma, Louisiana, USA. Cenac Towing is the fifth largest towing company in the U.S. and had offered the use of their facility at no cost to the JVOPS project. The company maintains a genuine, active interest in promoting heavy viscous oil pumping technology.

The Workshop Test Product was a heavy crude bitumen from the Japan Canada Oil Sands Project in Alberta. 500 barrels of the product were secured and shipped via railroad to Louisiana and three heated oil tank trucks handled local transportation to the test facility.

The Workshop test infrastructure evolved and grew as the Test Plan took shape. Special test tanks were constructed and additional tankage was rented to manage the Test Product, lubrication water and separated oil/water wastes. Platforms had to be constructed to provide adequate room for people and equipment at tank top level. Ramps were constructed to support the numerous runs of heavy discharge hoses that were needed for Test Product transfer and testing. A great deal of work went into protecting the site from contamination and preparation for decontamination of hoses and equipment. Last but not least were the logistical requirements of the workforce and site safety.

JVOPS Workshop Test Execution

Over 100 people from seven countries were present at the Workshop. The countries included Canada,United States, Great Britain, France, Norway, Finland and Denmark. Thirteen oil transfer tests were conducted between the 10th and 15th of December. Electronic and manual backup data were collected and compiled for future reporting by the Lead Engineer and by the U.S. Navy Supervisor of Salvage in conjunction with engineers from Science Applications International Corp. from Ottawa, Canada.

Figure 2. Canadian and U.S. Coast Guard personnel work side by side in preparing pump systems for testing. The Workshop gave personnel of each service the opportunity to learn more about each other's response techniques and equipment.

Figure 3. Flow-Enhanced, Water-Lubricated Product Flow.

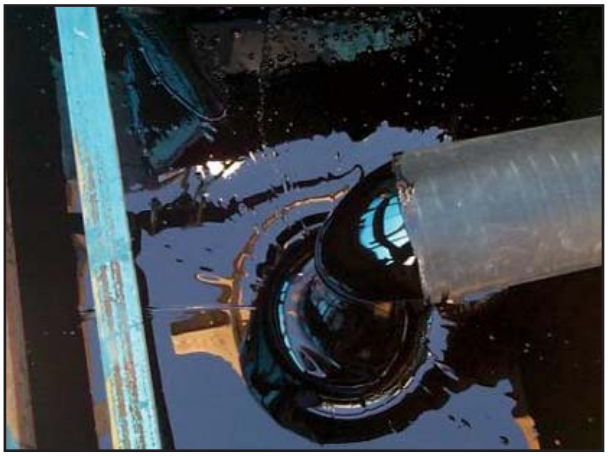


Figure 4. Non-Flow-Enhanced, Pure Oil (Test Product) Flow.

JVOPS Test Preliminary Conclusions

The JVOPS Workshop was a great success with significant positive results in reducing hose pressure and increasing flow rates and distances to a degree that is considered groundbreaking. Additionally, never before had so diverse a group of marine pollution responders worked together to improve heavy viscous oil lightering technology.

The magnitude of data retrieved during the many tests will, together with a comprehensive analysis, be disclosed in the Final Report. This report will be available as a public document in the Summer of 2004. The Final Report will present conclusions based on completed analysis of the test data. However, the following general observations can be made at this time:

- ❏ The tests in the 20, 30, 90, 150 and 450 m hose length ranges indicated no requirement for additional lubrication water when increasing the pumping distance.
- ❏ The DOP-250 (U.S. Coast Guard NSF main lightering pump), GT-185 and GT-A 50, pumps with their respective water injection devices, can be considered most suitable for pumping oil at these high viscosities.
- ❏ The recorded pump performance data, initial calculations on increased power consumption for increased hose length, and the maximum allowed power input to the hydraulic motors, indicate that:
  - ❏ The DOP-250 and the GT-A 50 should be able to deliver this 200,000 cSt. oil at nearly full capacity (100 m3/hr or 440 gpm, and 62.5 m3/hr or 275 gpm) through up to 800 m (2624 ft) of 150 mm (6") hose.
  - ❏ The GT-185 should be able to deliver this 500,000 cSt. oil at nearly full capacity (45 m3/hr or 198 gpm) through up to 225 m (738 ft) of 150 mm (6") hose.
- ❏ Many very valuable lessons were learned and new techniques used for cleaning the hundreds of meters of heavily contaminated discharge hose. Developments include a unique diesel flush and pigging technique that could be used in the future by responders.

JVOPS Workshop Follow-on Work

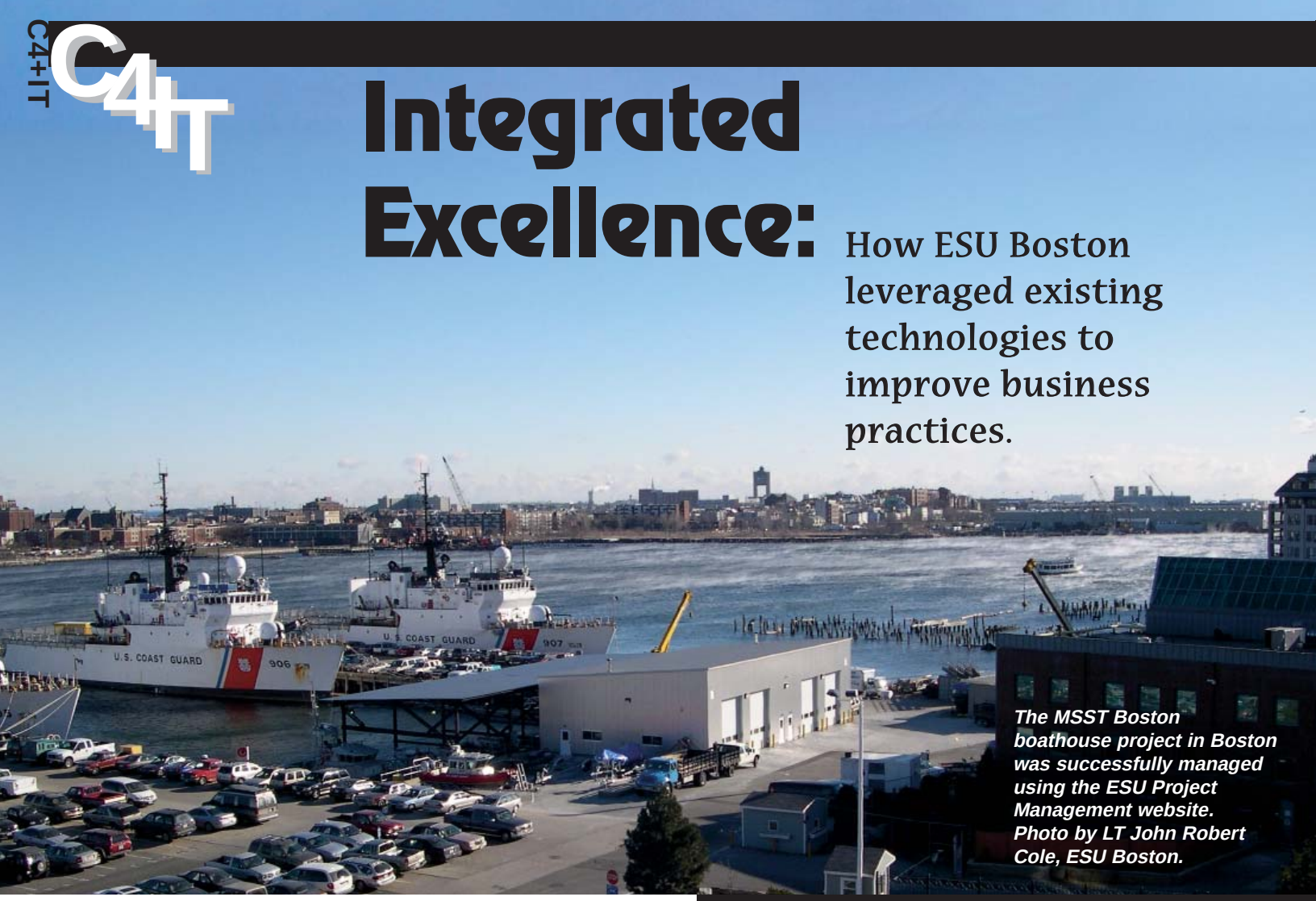
A strategy was developed prior to the Workshop to establish a near-term final goal for the joint work throughout 2004 and beyond, with milestones at significant points. Remaining milestones include:

- ❏ Issue Final Report to (Public Document) (Summer 2004, G-SEC-2).
- ❏ Improvement of Existing U.S. and Canadian Coast Guard Viscous Oil Pumping Systems (VOPS) based upon Final Report recommendations (2005).
- ❏ Continued Research and Development (R&D) for flow enhancement technology for pumping very viscous oils in an Arctic Environment.
- ❏ Continued R&D to explore alternative pumping enhancement methods other than injection lubrication for very viscous oils.

For more information on this unique marine response technology, please contact the Response Systems Team of the Ocean Engineering Division (G-SEC-2) at (202) 267-1094.

Integrated Excellence:

How ESU Boston leveraged existing technologies to improve business practices.



The MSST Boston boathouse project in Boston was successfully managed using the ESU Project Management website. Photo by LT John Robert Cole, ESU Boston.

by LT John Robert Cole
Chief, Systems Engineering and Management

In October of 1797, the *USS Constitution*, America's oldest commissioned warship, was launched from Edmund Hartt's Shipyard in Boston. The only one of six to survive intact (the *United States*, *Congress*, *Chesapeake* and *President* have long since been dismantled and the *Constellation* reconstructed as a museum in Baltimore, Maryland), she was built on the grounds where the Integrated Support Command (ISC) Boston now resides. Today, located within sight of Electronic Systems Support Unit (ESU) Boston -- also "born" on the same grounds as that of the *Constitution* -- "Old Ironsides" serves as a reminder that maintenance, support and innovation are integral parts of our nation's maritime heritage.

The Mission and the Challenge. White hulls, black hulls, small boats and large, the size and class are irrelevant when it comes to the dedication and effort provided by our highly trained technical personnel. With 10 Support Detachments and Details located throughout the First Coast Guard District, our electronic and Information Technology (IT) experts have only one goal: to maintain the operational readiness by professional execution of schedule preventative maintenance, casualty response and capital improvement/replacement of existing systems. Increasing requirements and longer patrols can easily take (and have taken) their toll on both old and new vessels. The challenge is to continue to meet or exceed customer expectations in this high tempo atmosphere.

Although staples to a maritime service, floating assets are not the only units the ESU supports. As the service provider of choice for the First District, our Shore and IT divisions are continually maintaining and upgrading existing telephone, data and National Distress System (NDS) circuits. The Systems Engineering division is frequently consulted for highly complex -- and highly visible -- shore side projects including stand up of two Maritime Safety and Security Teams (MSST), NDS site moves (most recently the Bank of Boston circuit) and cutter relocation

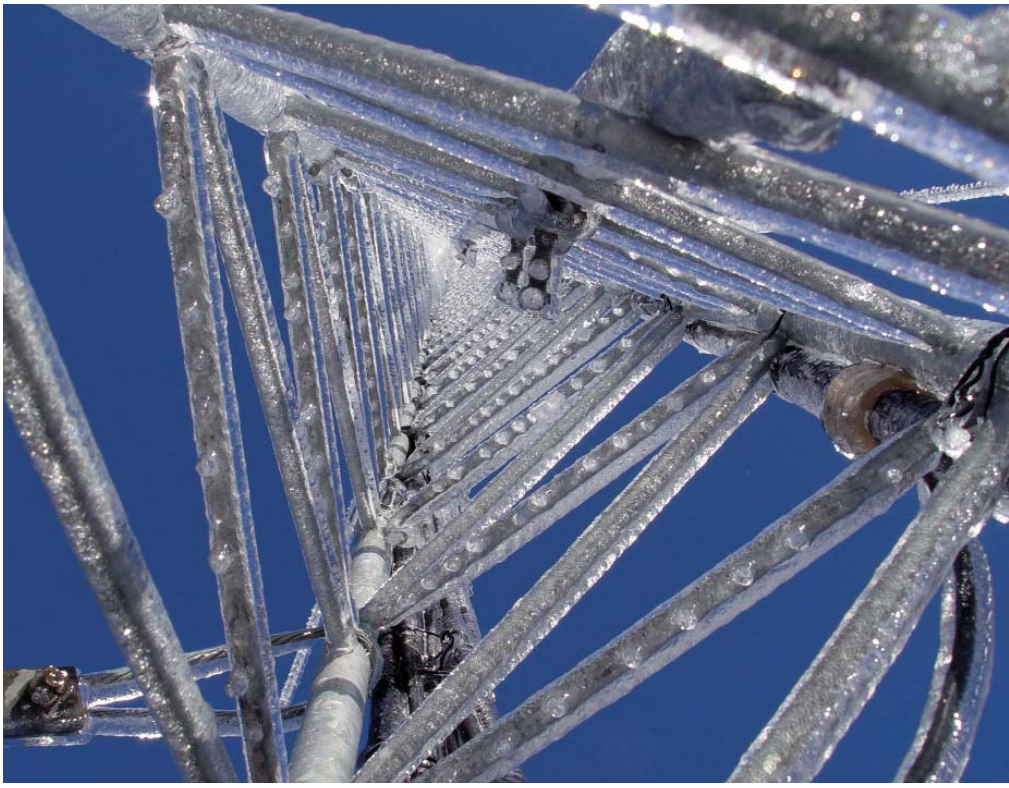
(the CGC TAHOMA and CGC CAMPBELL recently moved from New Bedford, Massachusetts to Kittery, Maine). At the Station level, the ESU has recently coordinated with local Officers-in-Charge and the Maintenance and Logistics Command (MLC) to fund and replace outdated communication consoles and associated electronic equipment.

The world of work is extremely broad. Capturing, formatting, disseminating, and, above all, making sound management decisions based on existing data is daunting. Fortunately, ESU Boston is forward thinking. Not a unit for maintaining status quo, the ESU quickly identified improvements in key processes. Taken singularly, each improvement far surpassed its baseline. Taken as a whole, an integrated system emerged that brought together the broad spectrum of work. The results have exceeded expectations.

The Innovation. ESU Boston firmly believes that innovation and quality are cornerstones to good customer service. Contrary to popular belief, innovation is not restricted to the latest and greatest gadget but encompasses a higher ideal. In essence, innovation is the idea that existing tools, techniques and personal talents can be utilized for creative problem solving. It is in this arena that ESU Boston has made its greatest impact.

Using existing technologies, namely Microsoft Internet Information Server, Microsoft Access and Microsoft Outlook, ESU Boston has successfully streamlined its project management, casualty reporting, training, local configuration control and Support Detachment weekly activity reporting systems (to name a few), and brought them to the desktop of the Coast Guard. Partnering with Northeastern University via the Maintenance and Logistics Command Atlantic's (MLCLANT) Student Educational Employment Program (SEEP), the ESU redesigned workflow to facilitate internal and external requirements. Research, development and discussion were conducted using the Baldridge Criteria for Performance Excellence as outlined in the Commandant's Performance Challenge (CPC).

Severe icing on the Cadillac Mountain NDS site resulted in a CASREP, managed via the CASREP On-line database, as well as two very cold technicians. Photo by ET2 Rob Piros and ET3 Kenny G. Brown, ESD Southwest Harbor.



The Processes

Project Management.

Developed in 2001, and enjoying its second update, the Project Management (PM) website is an electronic version of the bulky -- and inefficient -- brown tri-fold project folder. Projects are defined, per local electronics doctrine, as work activities exceeding 100 man-hours or $3,000.00.

Used by the Afloat, Ashore and IT divisions, the PM site has the capability for storing images and documents of all types. ESU Project Officers can track work activities, funding, personnel resources and time allocation using a user-friendly web interface. Featuring a search and filtering capability, related projects or Support Detachment affinities can be quickly determined. This provides both customers and decision makers a tool for managing their local resources as well as giving the ESU a tool for allocating additional resources when necessary.

The PM system integrates information from the Assets On-line database (hosting unit names, locations, images and addresses) and supports both project approval and project closure processes (including a CPC recommended customer survey questionnaire). Using the Simple Mail Transport Protocol (SMTP), new projects and recent closures are passed along automatically.

Casualty Reporting. ESU Boston originally developed the Casualty Reporting (CASREP) on-line system with their partners in Alameda, California. Highlighted at the 2003 Coast Guard Innovation Expo in Baltimore, Maryland, the web-based CASREP tracking system holds a wealth of information about the operational readiness of the Coast Guard in the First District. With over three years of data (including full copies of initial, update and casualty correct message traffic) on file, identifying common failures is vastly improved.

The CASREP on-line system also uses the Assets On-line database at its root. With the two systems tied together, unit CASREP history can be gathered with a click of the mouse. Full text searches of all messages are available.

Training Matrix. Sensing the need to carefully monitor personnel training requirements for contingency support, the ESU has developed a highly detailed web-based training matrix to quickly determine training deficiencies. Based, in part, on the recent rating merges between Telecommunication Specialist (TC) and Telephone Technician (TT) to Information Technologist (IT) and Fire Control Technician (FT) to Electronics Technician (ET), the training matrix tracks personnel requirements as well as documented proficiencies (the system also tracks Skill Soft completed on-line courses). Instances requiring immediate deployment of members with key skill sets in support of surge operations are greatly enhanced. Unit training readiness can be accessed near real-time and managed efficiently. Training requirements and available skills can be quickly evaluated at the unit, Detachment and billet levels.

ITC Eric Simmons manages the complete suite of ESU Boston on-line applications to exceed customer expectations for the IRM Division. Photo by LT John Robert Cole, ESU Boston.

IT Processes.

Although the Information Technology (IT) Division at the ESU has supported the equipment and services used for enhancing customer interaction, it was only recently that the division made the leap to paperless by streamlining their Local Configuration Control Board (LCCB) process. With the help of our skilled student intern, and the power of the web, the IT Division has greatly improved response time for non-standard computer software and hardware installations. Their automated LCCB request system now allows immediate submission and tracking of all non-standard devices and associated software. Types and locations of approved hardware and software can be identified immediately. This greatly enhances and improves efficiencies in upgrades, trouble shooting problems, system security and overall management of the system.

Integrated Excellence. The culmination of efforts required to digitize ESU processes is best exemplified with the ESU Boston Activity Report. The original Activity Report process consisted of Support Detachment reports posted electronically to a Microsoft Outlook Public Folder. Although rela-

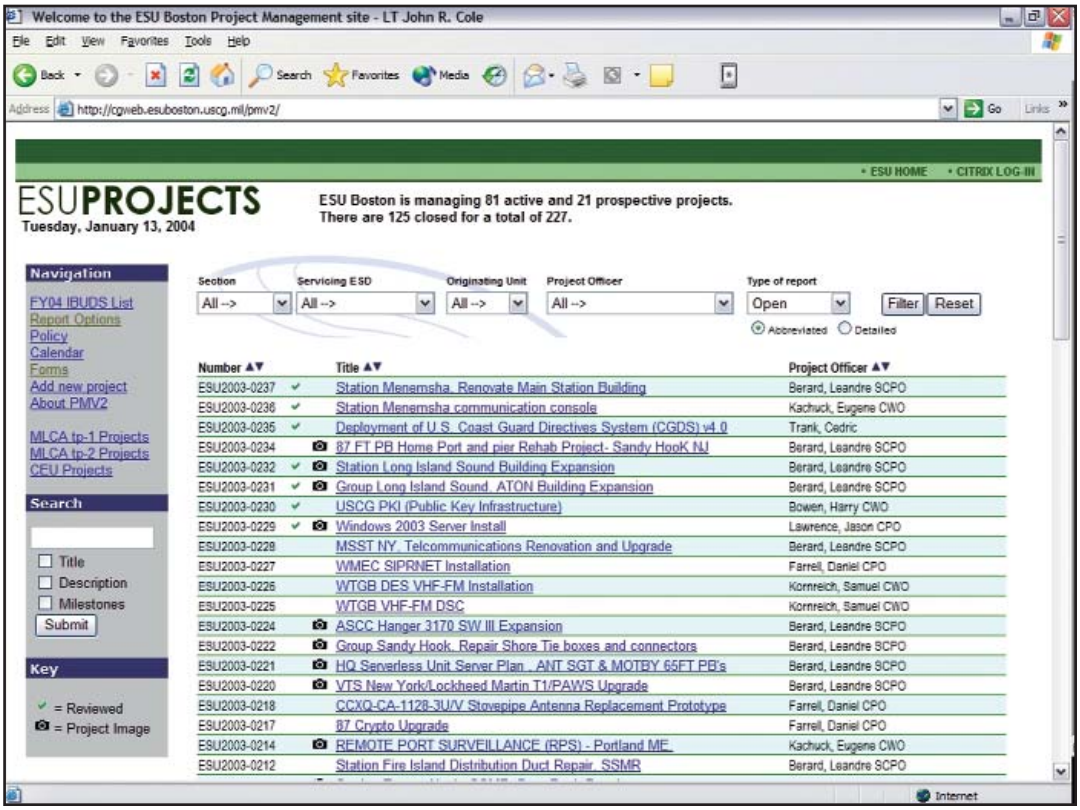
tively effective, seeking and categorizing data was impossible and, in many cases, information found in the PM and CASREP on-line systems were repeated. The challenge was to standardize input, streamline the process, and, most importantly, consolidate existing systems into one integrated format.

Late in 2003, the new and improved web-based Activity Report was born. Based on user input from each compartmentalized and independent process, the Activity Report draws its content directly from the PM, CASREP, training and asset databases while providing a standardized -- and searchable -- method of narration. The end result is a real-time view of work activities for any given region of the First District.

For the first time, operational commanders and decision makers have a tool for determining the general health of their resources without sacrificing additional time and effort on the part of Project Officers, casualty repair facilities or training officers. The whole is -- truly -- the sum of its parts.

The Future. ESU Boston continues its push towards "Integrated Excellence." At the Support Detachment in Cape Cod, effectively managing work, personnel and vehicle usage will be vastly improved by using a combination of touch screen technology and web-based services. The goal is to eliminate the mundane requirement for paperwork management and provide faster service and response time to critical operational units. Additionally, the system will provide automatic accounting of people, time and money to ensure fiscal responsibility.

The ESU Boston Project Management Website -- one of the cornerstone applications for managing First District electronic, telecommunication and Information Technology projects. Photo by LT John Robert Cole, ESU Boston.



In the summer of 2004, ESU Boston will make the transition from Microsoft Windows NT Server to Microsoft 2003 Server. This highly anticipated operating system upgrade provides a vastly improved environment for web-based development. Continually seeking alternatives to existing processes, the ESU anticipates consolidating the various methods of work tracking now used at its Support Detachments (work found outside the Project and CASREP realms). This will be the most aggressive -- and most complex -- process reviewed to date but offers high rewards. Managers, supervisors and individuals alike will be better equipped to make informed decisions during heightened states of activity.

Project Management, Casualty Reporting (CASREP), asset tracking and personnel training are just a few of the many systems accessible -- and integrated -- on the web. Highlighted at the 2003 Coast Guard Innovation Expo in Baltimore, Maryland, our forward thinking development has led to expressed interest by other Coast Guard support units desiring to improve their local processes. 2004 should be no different -- ESU Boston presented many new and exciting innovations to its customers during the 2004 Coast Guard Innovation Expo in Savannah, Georgia.

ESU Boston is setting the standard for integrated excellence!

Connecting People to Information

U.S. Coast Guard CG Central
Missions Advanced Collaboration Network

Connecting People to People

by LT Tom Shelton
CG-631

The Chief Information Officer (CIO) is launching a new Intranet tool this summer, and it is called *CG Central* (See http://mycg.uscg.mil or http://cgcentral.uscg.mil). This system was developed from an initial investment totaling more than 2 million dollars, and is officially known as the *Coast Guard Mission's Advanced Collaboration Network* -- the forerunner of a new CG Intranet designed to help in our pursuit of excellence in all areas of operation. The CIO is making this system available to all users and commands, free of charge, and it provides some of the following features:

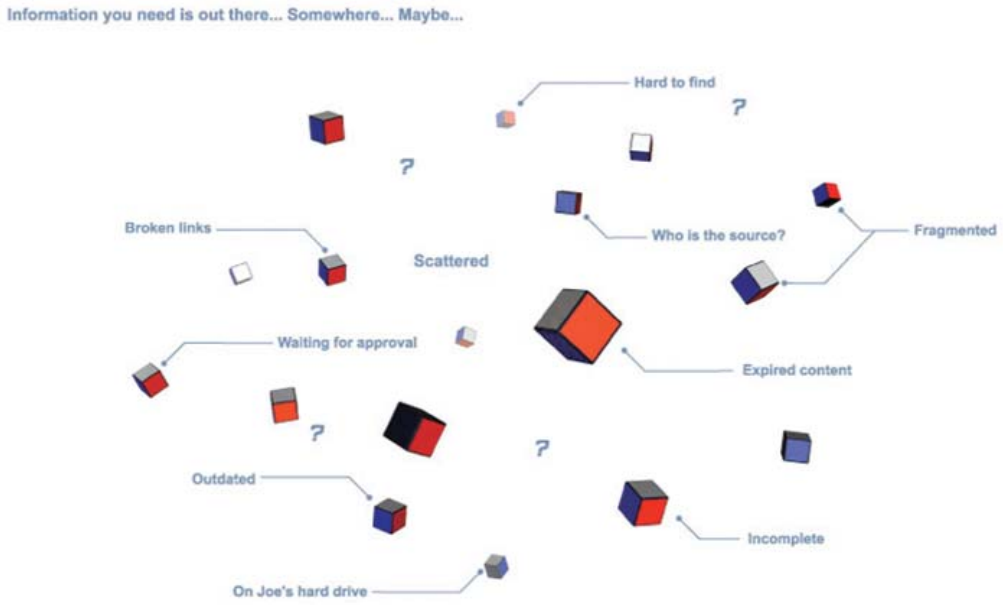
- ❏ Personalized information
- ❏ Standardized and User-friendly interfaces
- ❏ Powerful Search Engines: *Fast Data, People Search, CG Directory Search and Google*
- ❏ A standardized library of links and documentation for all USCG applications
- ❏ Reduced sign-on or "direct access" to some USCG applications
- ❏ A standardized library of links to other significant CG Intranet sites
- ❏ A standardized library of links to valuable sites in the government
- ❏ Standardized community libraries of: authoritative guidance, Standard Operating Procedures (SOPs), job aids, training aids, FAQs, presentations, briefs, reports and more . . .
- ❏ A standardized content management system for all portal information
- ❏ Easy publishing: no HTML required
- ❏ A portal link maintenance system -- guarantees working links
- ❏ A personal library of portal shortcuts that always work, from anywhere
- ❏ A user controlled content Alert system
- ❏ Feature rich *Microsites* for 'members-only' group, team and project collaboration
- ❏ User controlled outlook downloads for *microsite* meetings and tasks
- ❏ Information, user and *Microsite* management processes that strengthen by direction authority and increase speed to results for commands (see COMDT INST 5230.62)
- ❏ An approved, secure, integrated and feature rich Instant messaging system (*CG Talk*)

Sound complicated? Well it's not! Here are some comments from users like you:

> ***"CG Central is easy to navigate . . ."***
> CWO Sonia Kendall, Coast Guard Personnel Command
>
> ***"Keep it coming! This is the best looking, most user friendly CG application/site yet . . ."***
> LCDR Michael Dickey, CO, CGC JUNIPER

In fact, *CG Central* was recognized internationally (2003) by the *Nielsen Norman Group* as one of the top ten best Intranet designs in the world (See: http://mycg.uscg.mil/uscg_docs/portal/MyCG/Editorial/20031006/intranetdesignannual_2003_CG_excerpt.pdf). The Coast Guard was the only government agency on that "top ten" list, and we were competing against lucrative companies like Chevron, Texaco and Wachovia -- companies that invested a lot more money in their efforts than we did. That evaluation was all about 'usability,' and it foretells of what the Coast Guard should reap from our years of passionate hard work and smarter thinking.

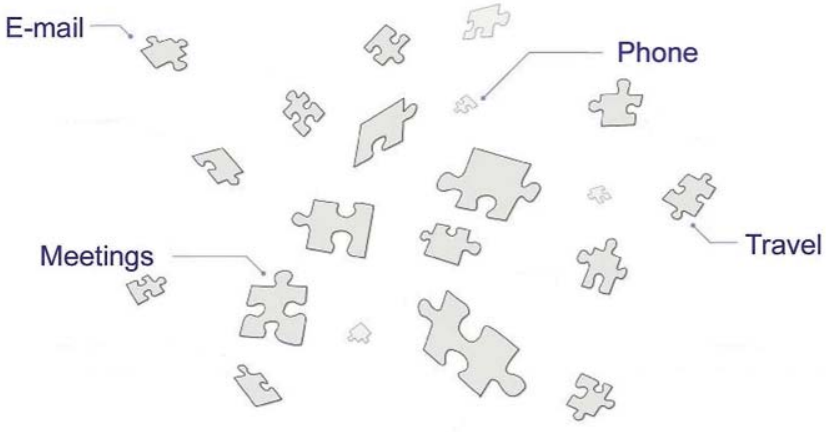
So, What's All the Fuss About? It all starts with our current Intranet -- though there are many Centers of Excellence, and the Google search engine has helped, our experience on CGweb can still be characterized by the graphic to the right:



But our frustrations are about more than just finding official information in websites, they are also about our difficulties in managing our daily work for real results, as individuals and as groups. Our Intranet experience is also wrapped up in email, email personal folders and public folders, we look to these technologies to help us collaborate, to remember, to share, or to obtain insights beyond official policy. This is worth a few more lines.

People struggle to 'stay on top of' or 'get insights into' issues affecting themselves and their groups. Email is what we use the most, but usually not everyone sees the 'message' they need to (forwards), while others don't need to see the message right then. Inboxes are over-stuffed with email, while personal folders and offline .pst files grow as people struggle to decide what to keep and where. Messages are deleted that shouldn't be, others are kept that should be thrown away. Key documents are often too large, so we break it up into smaller files, or fax it, or wait till we meet to hand out paper copies. Public folders are often used as 'group' libraries, but they can only be used by those on the same domain, and often contain a lot of 'dead' content -- whose responsible to keep a public folder up to date? Who cares? Likewise, on-site meetings and teleconferences can help fill some of the gaps, but usually not enough.

The final point is that we often resign ourselves to a feeling of 'not enough information' and not enough time, and move on with our best analysis at the time. We find it difficult to share our insights, our hard earned lessons, or preserve our important results or best practices (knowledge), with these 'puzzle pieces' remaining 'at large' for most of us in the Coast Guard.



CG Central brings to the table some key technologies (hard and soft) designed to help us (as individuals, groups and commands) to better manage these problems by energizing our Intranet experience. The following is an overview of SOME of these capabilities:

You Find Information and Information Finds You. Consolidated, comprehensive and authoritative information, combined with professional standards for 'just right' content management and navigation, delivers quicker and more effective searches, personalized information and content alerts for information important to you.

You Find People. People Search, CG Directory Search, Enterprise Data Warehouse data feeds, *CG Central* specific user profile data, email-able content experts, communities and projects contact info -- these are some of the technologies that *CG Central* offers to help you connect to the right people.

You Collaborate. *Microsites* and *CG Talk* offer technologies to help you work as a group, virtually. *Microsite* technologies include: members-only access, full Microsite administration rights for the owner(s), to-dos, checklists, announcements, meeting and event lists, outlook integration, document folders with version control, thread-able discussion

groups, subgroup access controls and mini-*Microsites* for sub-groups or phases for project teams. *CG Talk* technologies include: instant messaging, microsite driven automated 'buddy lists,' user controlled 'buddy lists,' group conference rooms, archive-able discussion scripts, secure transmissions and file transfers.

Together, the above features help a group or command to:

- ❏ Reduce Email chaos.
- ❏ Quickly find or share official policy or guidance.
- ❏ Manage issues in central location.
- ❏ When needed, privately come to conclusions or share insights.
- ❏ Capture and develop new knowledge.
- ❏ Quickly create and share new policies or guidance based on that new knowledge.

In short, *CG Central* makes it easier for individuals to pull the pieces of a puzzle together.

But there is more, for pulling the puzzle pieces together as a group is important -- but your personal effectiveness is critical for that group to succeed. The next feature set of *CG Central* lets you organize your content and work in ways that fit your personal needs.

You Get Organized. Customizable and comprehensive libraries, customizable tab layouts, shortcuts, user controlled outlook integration, content alerts, user controlled announcement alerts from *Microsites*, easy portal publishing access, a personal publishing inbox, *My Readiness* tab, save-able advanced search criteria, and exportable results for *People Search* and *CG Directory Search*, *Microsite* knowledge repositories, *Microsite* buddy lists in *CG Talk* -- these are some of the technologies that *CG Central* offers to help you get better organized, as well as improve and sustain your daily effectiveness.

Our pilot users and early adopters think so:

> ***I have requested that my entire crew be activated in CG Central so that we can begin using the site. The "My Unit" tab will be a wonderful resource to my crew, many of whom are young enough to be more comfortable digging through information on a web page than looking things up in a unit instruction binder. The "Resources" tab and the search capability finally gives us the ability to conduct comprehensive searches through all CG Directives for a topic of interest - an invaluable resource that I thought we had lost when we upgraded to the PDF instructions from the old CGDS application. The "CG Directory" tab will become the destination of choice for anyone due for a PCS transfer, and the "My Readiness" tab finally gives field units a useful look at the data that we painfully enter into Direct Access, AOps, TMT, and the CASREP system.*** LCDR Michael Dickey, CO, CGC JUNIPER

> *"**We have approximately 84 members of our microsite coming from all over the country and from both the C2 and the IT communities. We use the microsite to pass along minutes of actual meetings, to assign taskings, to collaborate on defining terms and policy, and to coordinate the details of future events. Without using CG Central we would have been forced to schedule more in person meetings amongst various team members. This may have involved more travel, but would certainly have taken more time and effort than the virtual collaboration required. This has also reduced the number of emails coming to my in box and made document management MUCH easier."*** LCDR Andrew Sorenson, CG-632

So what made all this happen -- what has allowed the Coast Guard to leap frog our Intranet capabilities? It really is all about the design, but there is no way to go into detail about that now, but a little bit will help.

Intro to *CG Central's* Design. The foundation *CG Central* is built upon *Broadvision* (BV) technology, which is the same technology platform for other leading government, corporate and commercial sites. But that technology, though

very important, was not the 'silver bullet,' for what has truly set the Coast Guard's new Intranet apart is the development approach taken to this system. *CG Central's* design is truly the result of input and guidance from hundreds of "Coasties," input that was vetted and guided by strong partnerships with proactive commands and directorates. But the lion share of the success is really a result of Operations Systems Center's (OSC's) best practices for customizing, enhancing and integrating other capabilities, for *CG Central* is built firmly on their processes for pulling together and managing all the requirements and source code. Configuration management really works!

One key component in *CG Central's* design that is worth mentioning is the personnel and unit data feeds from the CIO's *Enterprise Data Warehouse* (EDW), which was originally a system started by Marine Safety and Environmental Protection Directorate (G-M). The concept of the EDW is simple: take what we (as an organization) already know in one system and share it with all systems. The goal in this 'sharing' is to reduce the costs to the CG for getting to results, and the burdens on the end users. So, the EDW is simply a centralized data 'repository' to which any Coast Guard system can regularly send their authoritative data, and from which other systems can regularly import that data. It really simplifies things for both the developers and users of systems. Simplicity is beautiful and powerful. Let me illustrate, for this data from the EDW has allowed *CG Central* to do many new things for the Coast Guard:

- ❏ Pre-stage user accounts for military and government service personnel for a short, simple and fast registration process.
- ❏ Automate maintenance of all *My Unit* publishing permissions by tying a user's permissions to their Department ID assignment in *Direct Access* -- the same data used to cut "paychecks." A daily feed of this data keeps it as fresh as possible in *CG Central*, without adding a greater workload on a unit or end-user.
- ❏ Provide standardized and easy to maintain Intranets and websites for every unit in the Coast Guard (goodbye FrontPage classes).
- ❏ Provide an advanced *People Search* capability.
- ❏ Provide an advanced *CG Directory* search capability.
- ❏ Provide easy user access to important information in other systems, without forcing users to become 'experts' in that system. A good example is the *My Readiness* tab, which automatically presents information as graphs, tables, and reports created in the *Readiness Management System (RMS)*. But a user is explicitly limited to their authorized level of access to Sensitive But Unclassified (SBU) information in RMS by their 'profile' in *CG Central* -- without having to sign on to the system.

Deployment Phase -- Get Connected. A proactive effort is in progress with Headquarters Directorates, HQ Units, Maintenance and Logistics Commands (MLCs), Areas and Districts to enable commands to leverage *CG Central's* technologies.

HQ Directorates and their HQ Units are currently preparing for or are actually migrating enterprise content and community processes into *CG Central*. Workshop trainings and briefings are in progress covering how commands can use *CG Central* to solve problems, as well as the roles and capabilities of their Web Content Managers (WCMs, see COMDT INST 5230.62) in *CG Central*.

CG Central's management is also finalizing schedules (with Area, MLC and District leadership) for the same training and briefings for Unit WCMs. This is the final step to begin full scale *CG Central* user activations, which is scheduled to begin this summer and progress to completion in 2004 or early 2005. This is the largest information system the CG has deployed to date, so the Assistant Commandant for Command, Control, Communications, Computers and Information Technology (CG-6) will actively monitor system, network, organizational and end user performance impacts as the roll out progresses, making adjustments as needed.

During the field unit activation phase of *CG Central's* deployment, unit WCMs will be able to begin publishing to their Unit's 'page,' called the *My Unit* tab in *CG Central*. This page is only viewable by a unit's own personnel -- it is an 'internal Intranet.' However, field experts identified some of *My Unit* information as valuable to all Coast Guard users, and so *CG Central* automatically shows that information on a Unit's *CG Directory* page. Publishing content for *CG Directory* viewing will be the focus for units at this time -- at least for publishing. But unit WCMs will also be able to create *Microsites* (collaboration centers or *micro-portals*) for their commands. WCMs are permitted to create *Microsites* as an extension of their CO's *by direction* authority, to improve the support of internal and external natural working groups, action teams, process improvement teams, project teams, etc.

So, what's the point of this article? Simple --*CG Central* will be deploying to your Command soon, so *Get Connected*. Watch for further guidance from your command's leadership, ALCOASTS and from the *CG Central News* tab at http://mycg.uscg.mil. ST

SUPPORTING HOMELAND SECURITY

Commandant (G-S)
United States Coast Guard
2100 Second Street, S.W.
Washington, DC 20593-0001